



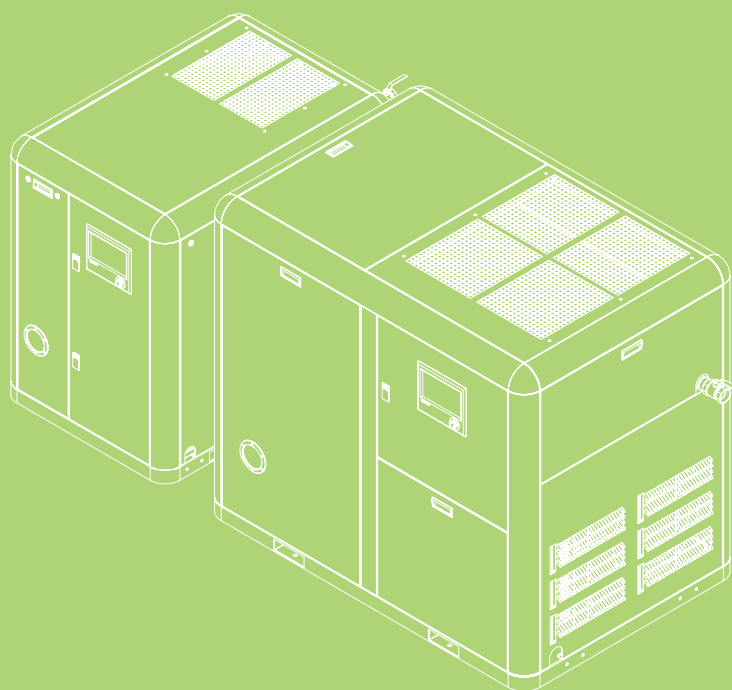
# **GRH3** SERIES

## User's Manual of Compressor



### **Micom Controller**

**GRH3** - 20A, 25A, 30A, 35A, 50A, 75A, 100A



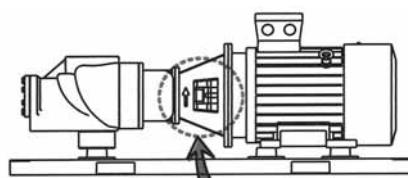
 **HANSHIN MACHINERY CO.,LTD.**



## DANGER

Be sure to check airend rotating direction when operating the compressor for the first time after installation.

If it rotates in the opposite direction, the airend can be damaged.



Be sure to check the rotating direction !

The user's manual is prepared, based on GRH3-100A.

Read this manual carefully before installing and operating the compressor and use it properly.

In addition, after reading this manual, keep it close to the compressor for future reference such as repair, maintenance or trouble.

# Preface

Thank you for purchasing Hanshin Compressor. Hanshin Screw Compressor is the product developed by our long history, abundant experience and accumulated technology.

The screw compressor has been verified for the performance by examined design and appropriate reliability test and is conveniently programmed to be optimally operated when the control-related data are automatically calculated and changed if a user simply changes the operation pressure by Micom's control almost close to AI.

The function guarantees that the compressor operates optimally, so the company assures of high performance, highly evaluated from users.

Every machine and controller may show 100% of the performance as long as it is clearly understood and well maintained. Please read this manual carefully before use.

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# About how to use the manual

The screw compressor is intended to be used domestically (the Republic of Korea).

- The manual describes the routine operation, repair and maintenance of the manual as well as the installation, general management and periodic maintenance of it.
- Before installing the compressor, carefully read this manual, fully understand it and follow the description. Also, keep this manual handy for future reference.
- If you find any doubtful content in the manual, please contact your dealer or the company's A/S service center(TEL.031-494-8484).



Warning

- Do not directly inhale compressor air nor use it for machines designed for the respiratory organs.
- Direct inhalation may cause dangerous unexpected accidents such as dyspnea.

## ■ Type Explanation

**GRH3 - 100 A**

Output (HP)

Air cooling : A / Water cooling type : W

The informative plate as model, serial number, operation pressure and voltage is attached on the left side of the compressor. Please fill it for your regular maintenance and parts order.

MODEL  
SERIAL NO  
WORK PRESSURE  
VOLTAGE  
MANUFACTURING

# 1. About Safety

For the safety purpose, read the cautions and warnings specified in the manual carefully and fully understand them for proper use. The chapter especially highlights the safety items.

## ■ 1-1 General Cautions

- The installation, operation, preservation, repair and other works of the product should be executed by a competent engineer.
- If a user adds a control circuit to the product or attempt to modify or alter the product without permission, it may cause physical injuries or damages on the product due to the malfunction of the protective devices, which may not be covered by the warranty. At the moment, the product may be repaired by our pay service.
- Do not use the compressed air of the compressor for direct inhalation or air supply source of the respiratory organs. It may cause dangerously physical injuries.
- [Warning] or [Caution] in the manual contains important information that should be always followed.

## ■ 1-2 About Marks and Symbols

The important items to be noted for the safe use and trouble avoidance are marked as below, so every operator should understand and keep them.

### Marks



#### Warning

The mark is displayed when there is any possibility of death, serious injuries or other dangerous situation unless the product is handled properly.



#### Caution

The mark is displayed when there is any possibility of slight injuries, dangerous situations and damages on properties unless the product is handled properly.



#### Prohibition

It means prohibited operation or handling.  
The prohibition is displayed as characters in the mark.

### ■ 1-3 Check Caution/Warning Label

#### 1. GRH3-20A, 25A, 30A, 35A, 50A



#### Caution



#### Discharge pressure ejection

- When checking/replacing parts, the compressor should stop with the pressure set to 0
- A special attention should be paid around a safe valve because it may work during operation.

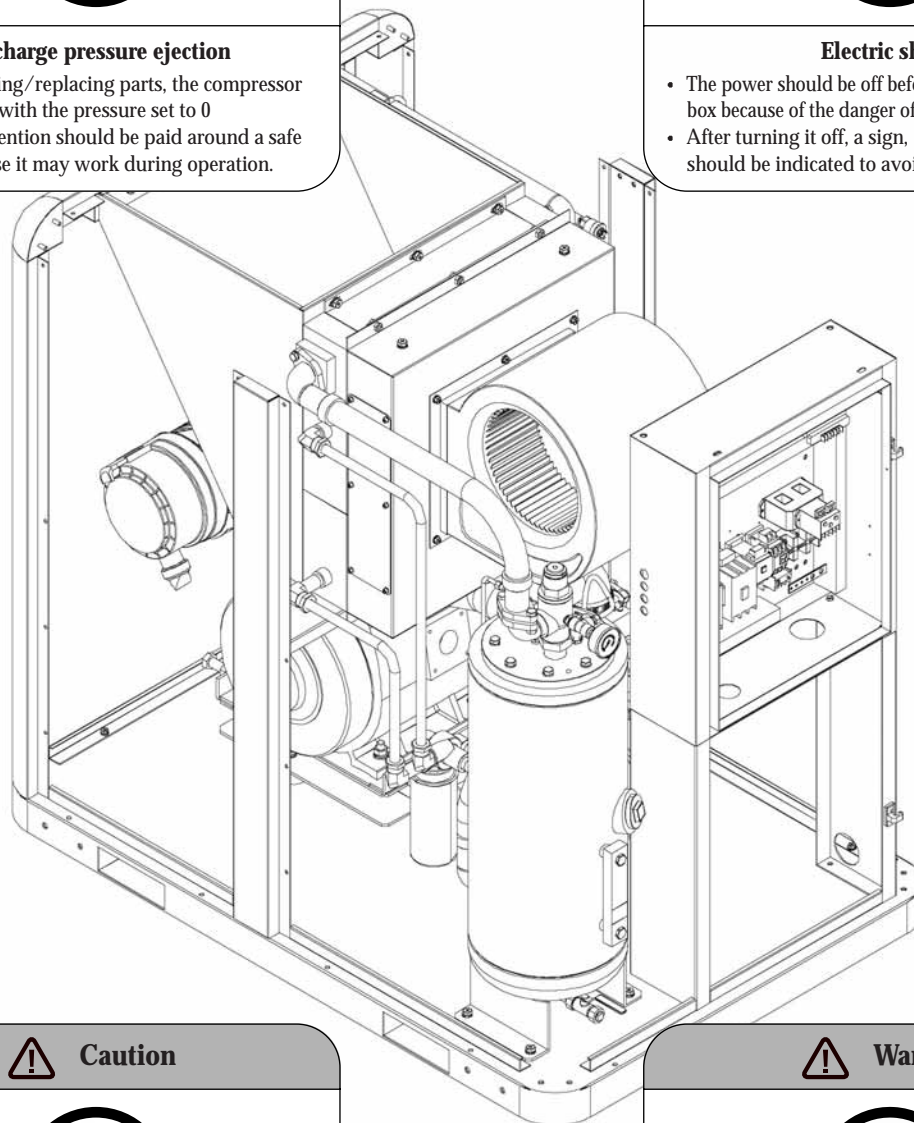


#### Caution



#### Electric shock

- The power should be off before checking the electric box because of the danger of electric shock.
- After turning it off, a sign, "Power-off for check" should be indicated to avoid accident.



#### Caution



#### Beware of a scald

- Oil cooler, air end and tank may be very hot during or just after operation, probably causing a scald.
- When working around any heating source, you should wait until it is cooled after turn-off



#### Warning



#### Be careful of being rolled by rotation

- Do not touch yourself or other articles on any rotating parts such as main/fan motor.
- The power should be off before repair, maintenance and other works

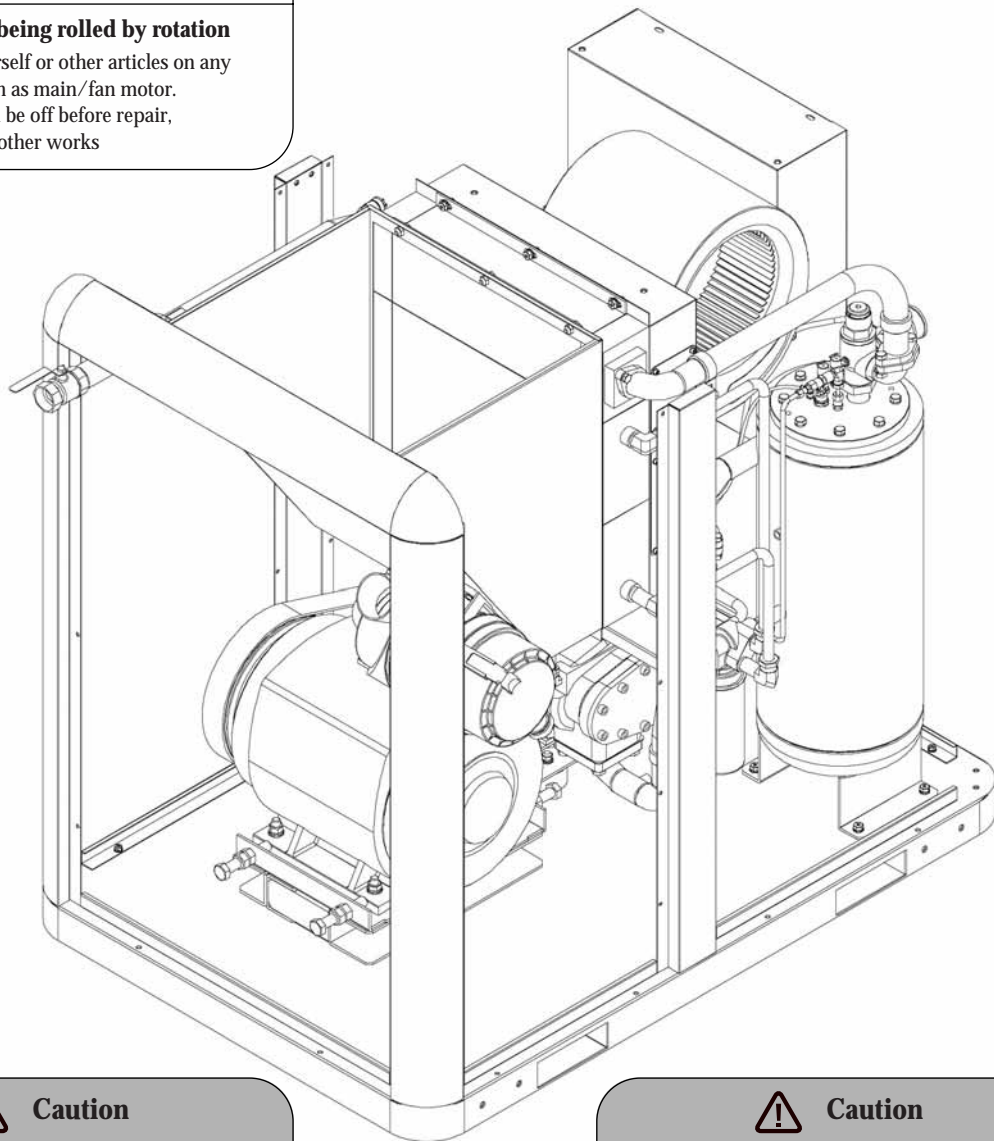


### Warning



#### Be careful of being rolled by rotation

- Do not touch yourself or other articles on any rotating parts such as main/fan motor.
- The power should be off before repair, maintenance and other works



### Caution



#### Cautious of Inhalation

- Poorly-ventilated indoor operation may cause death or accident.
- Do not directly inhale the compressed air nor use it for air supply of the respiratory organs.



### Caution



#### Beware of a scald

- Oil cooler, air end and tank may be very hot during or just after operation, probably causing a scald.
- When working around any heating source, you should wait until it is cooled after turn-off



## 2. GRH3-75A, 100A



### Caution



#### Discharge pressure ejection

- When checking/replacing parts, the compressor should stop with the pressure set to 0
- A special attention should be paid around a safe valve because it may work during operation.

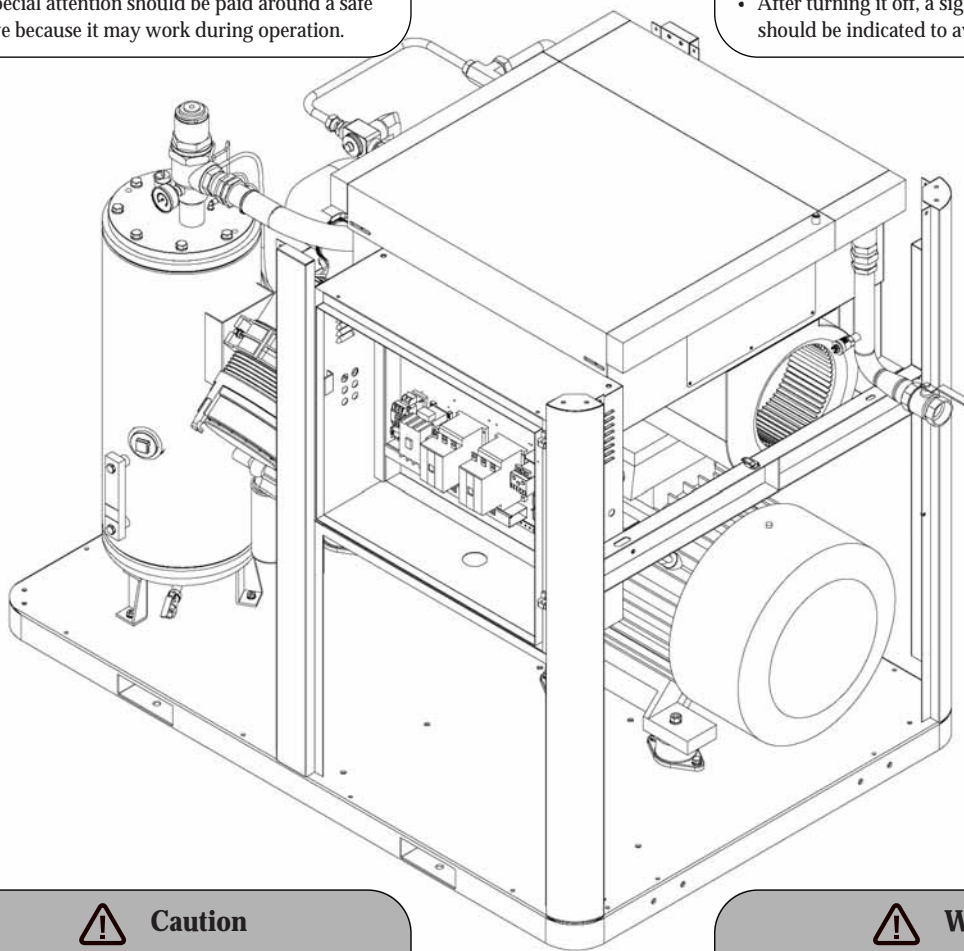


### Caution



#### Electric shock

- The power should be off before checking the electric box because of the danger of electric shock.
- After turning it off, a sign, "Power-off for check" should be indicated to avoid accident.



### Caution



#### Beware of a scald

- Oil cooler, air end and tank may be very hot during or just after operation, probably causing a scald.
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### Warning



#### Be careful of being rolled by rotation

- Do not touch yourself or other articles on any rotating parts such as main/fan motor.
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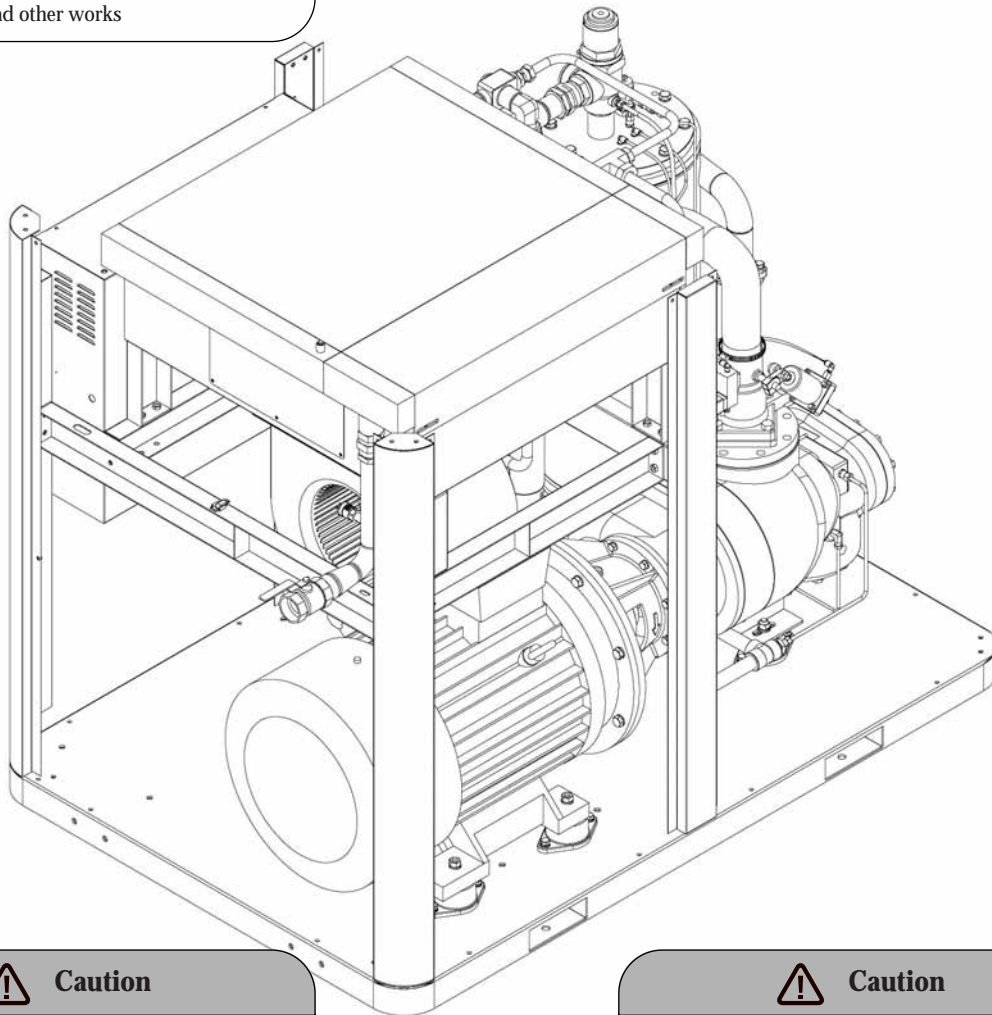


### Warning



#### Be careful of being rolled by rotation

- Do not touch yourself or other articles on any rotating parts such as main/fan motor.
- The power should be off before repair, maintenance and other works



### Caution



#### Cautious of Inhalation

- Poorly-ventilated indoor operation may cause death or accident.
- Do not directly inhale the compressed air nor use it for air supply of the respiratory organs.



### Caution

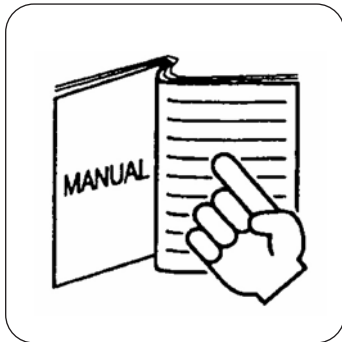


#### Beware of a scald

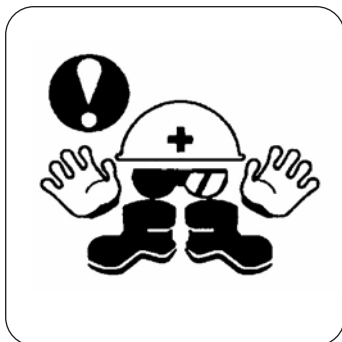
- Oil cooler, air end and tank may be very hot during or just after operation, probably causing a scald.
- When working around any heating source, you should wait until it is cooled after turn-off

## ■ 1-4 Safety Rules

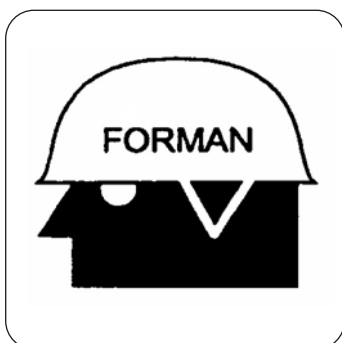
### Common rules



- Before operating, maintaining or repairing the compressor, fully understand the manual.



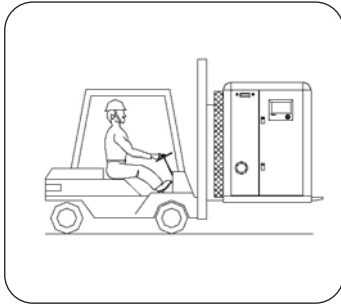
- Make sure to wear proper safety devices and uniform when repairing or maintaining the compressor. Especially, when assembling or disassembling a heavy article, you should put on helmet and safety boots.
- Since a very hot air may be emitted, you should wear protective uniform or goggles.



- Setting or re-setting the values of the compressor should be executed by an expert. If it is not possible, an engineer(worker) should follow the directions from an expert or an experienced engineer.

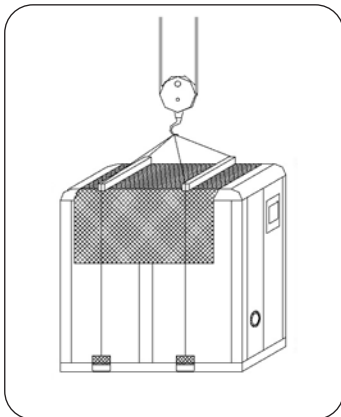
## Transportation

### ■ Using a forklift

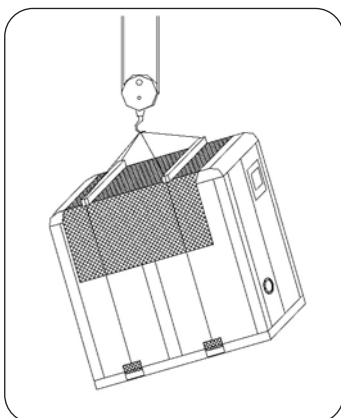


- When transporting the product, it needs covering with a cloth to avoid scratch or transformation.
- A forklift used to transport it should be a suitable type to avoid overturn and other accidents.

### ■ Using a crane



- When transporting the compressor using a crane, check the load and slowly move it by using a rope or a crane.
- The compressor should be covered with a cloth or shock-absorbing materials to protect against the rope on the top.



Warning

When moving it using a crane, move it slowly while leveling. Unbalanced transportation may cause a fall, probably leading to a loss of lives.



Warning

No one is allowed to be under the compressor while it is being moved. It may cause a loss of lives.

■ 1-5 Installation Place and Cautions for Installation

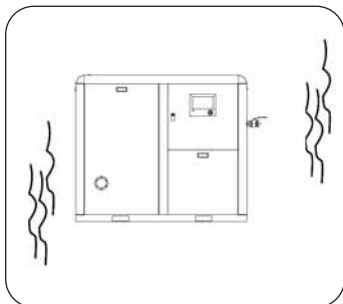
Place

The compressor is designed to use indoors. Please avoid installing it outside.



Caution

Installing in a place directly exposed to raindrops or underground with hot ambient temperature may cause electric shock, drain or rust.



Caution

Installing the compressor in a place with vibration may cause bad contact, destruction of air end and piping, so a measure should be taken before the installation



Caution

If the compressor is installed in a place with harmful gas, it may cause oxidization of lubricant and corrosion parts.



Caution

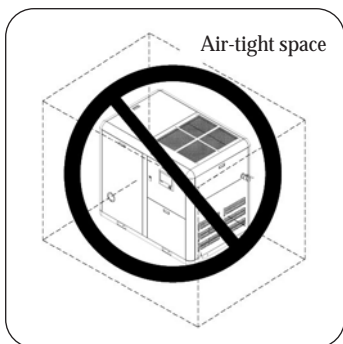
Do not leave any flammable materials around the compressor. Any work causing a fire is also prohibited. Once a flame is moved into the compressor, it may cause damages.



Caution

Do not install the compressor in a place with 40°...and higher ambient temperature. It may cause a fire or damages on the compressor.

Installation

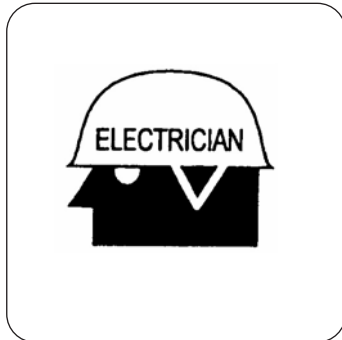


Caution

When installing it in an airtight space, it needs induction and ventilation pipes. And the vent needs a fan to ventilate the space.

## ■ 1-6 Cautions for Electric Wiring

### Wiring



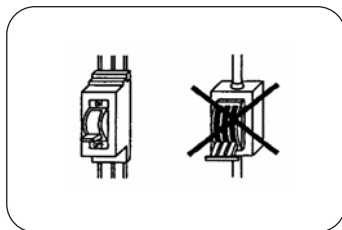
- Wiring should be executed in accordance with the indoor wiring rules of the common industrial technology standard, electric facility standards.
- Wiring should be executed only by a competent electrician.
- When wiring on the terminals of the compressor, it should be wired to avoid any bending part while a hole into which wires are penetrated should be protected for the sheath from vibration by using rubber and other materials.



Caution

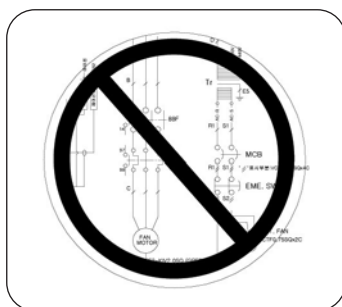
Since electric leakage, weak insulation, overcurrent, ground fault, open-phase operation or defect of protective devices may cause a fire on electric circuits, it should be wired in accordance with the indoor wiring rules and periodically maintained.

### Circuit Breaker



- Install a circuit breaker suitable for the type on the power lead-in.

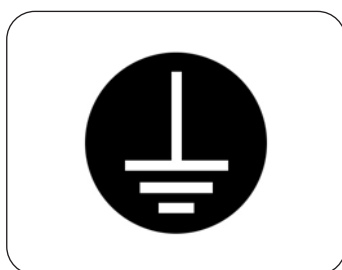
### Protective Devices



Caution

Removing and improving the compressor protective devices or changing the settings may cause an accident. Never attempt to change or alter the settings of protective devices.

### Grounding



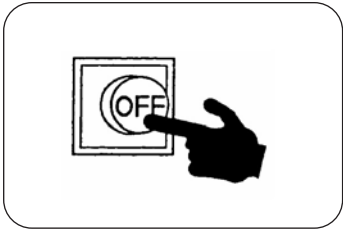
- Connect the grounding to the grounding terminal inside the electric box.
- The grounding should be type 3 grounding if the voltage is lower than AC400V or special type 3 grounding if the voltage is AC400V and higher.



Caution

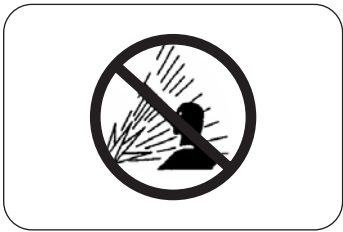
Without grounding, it may cause an electric shock accident or failure of the compressor.

■ 1-7 Cautions for Operation



Caution

If a trouble occurs, immediately stop the operation to avoid any physical injuries or damages on the compressor. In an emergency, promptly press Emergency Stop button to stop it.



Caution

The compressor's discharge pressure is very high. Never inject it toward a person.



Caution

To avoid any electric shock, the power should be off before repairing or maintaining the compressor.



Caution

Do not leave any flammable materials around the compressor. Never attempt a work probably causing a fire.



Caution

Do not inhale the compressed air from the compressor nor use it as the air supply for the respiratory organs.



Caution

Do not try welding or any similar works around the compressor. Flames may cause a fire.



Caution

Do not touch any hot parts of the compressor during or just after operation. Also, during maintenance, do not touch yourself on them. It may cause a serious scald.



Warning

Make sure to turn off the power before handling the main motor or fan motor.



Caution

Note that operation stand-by in auto mode or compressor stoppage in schedule operation may resume the operation.



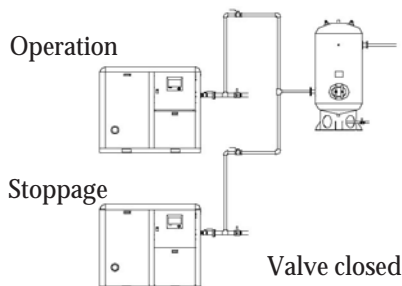
Caution

Do not set the pressure higher than the specification on the plate of the compressor. It may cause a trouble.



## ■ 1-8 Cautions for Stoppage

### Parallel Operation



- Once the compressor stops, close the ball and valve of the discharge pipes to avoid any backward flowing of water and other materials.

### Stoppage for a long while



- Turn off the main power when the compressor is not used for period of long time.
- Operate it once a week for, at least, 30 minutes to avoid rust inside pipes of the compressor.

## ■ 1-9 Cautions for Maintenance

### Pressure



Caution

Stop the compressor and check whether the pressure is set to "0" bar and whether any remaining pressure inside pipes exists.

### Power



Caution

When replenishing oil or checking the electric box, make sure to turn it off first.

### Power



- Keep the operation log.
- Make sure to use the genuine parts only. The compressor may not work nor cause a trouble unless the genuine parts are used.

### Routine Maintenance



- Routinely check the compressor.  
For the checklist, refer to the contents specified in page 63

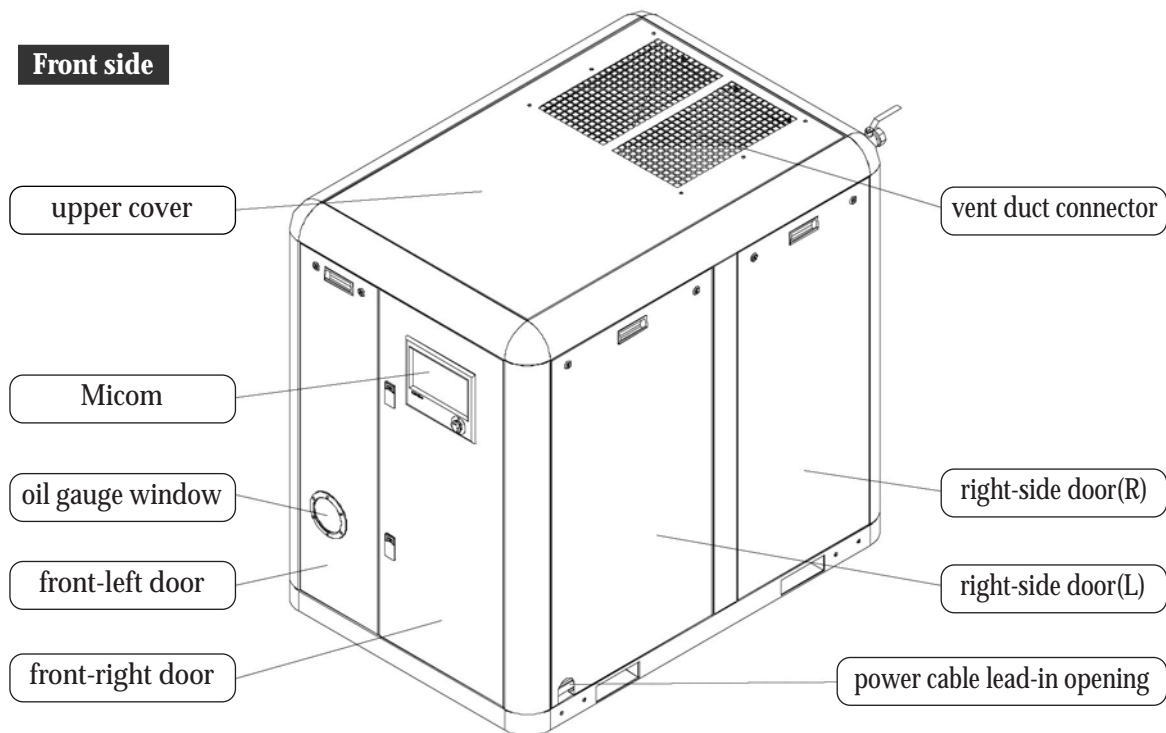
## 2. Names of Parts

### ■ 2-1 GRH3-20A, 25A, 30A, 35A, 50A

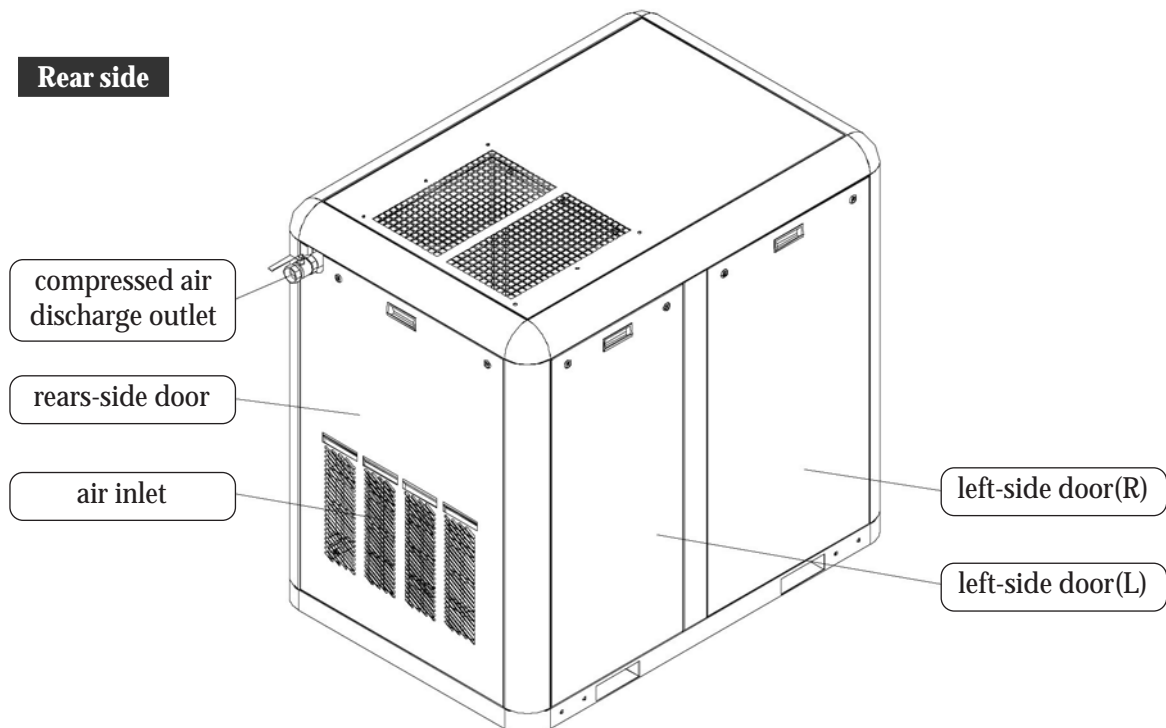
Fully understand the names and functions of parts relating to the routine operation and manage the compressor.

#### 1. Appearance

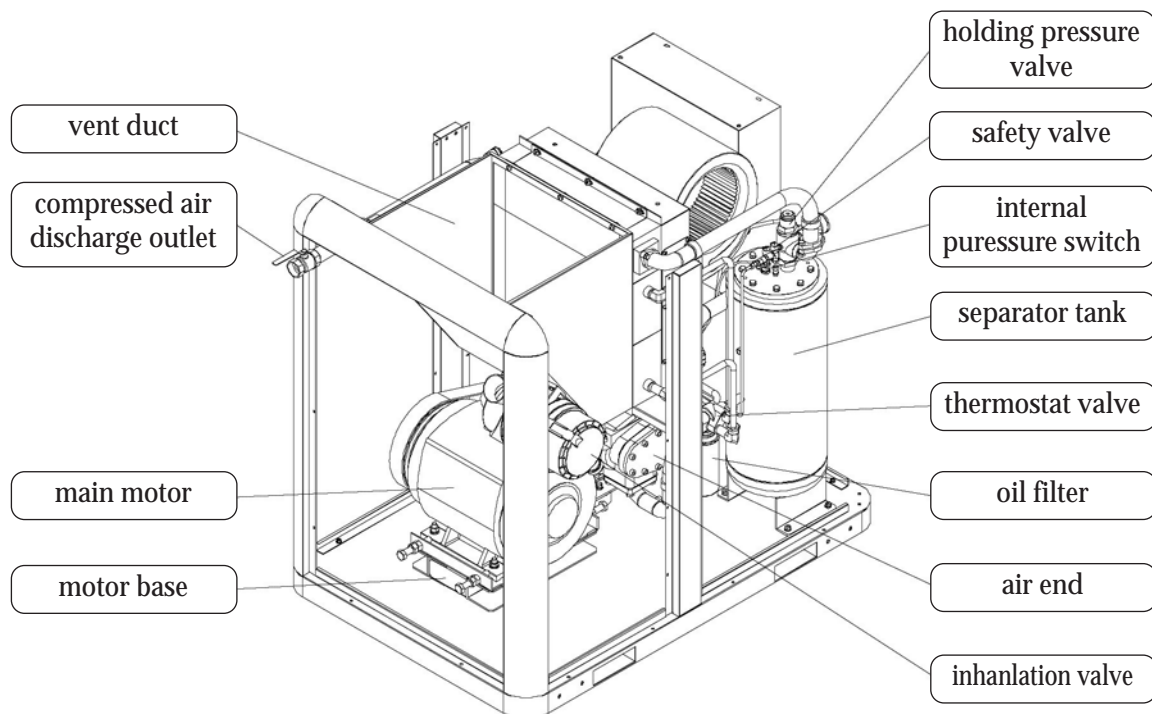
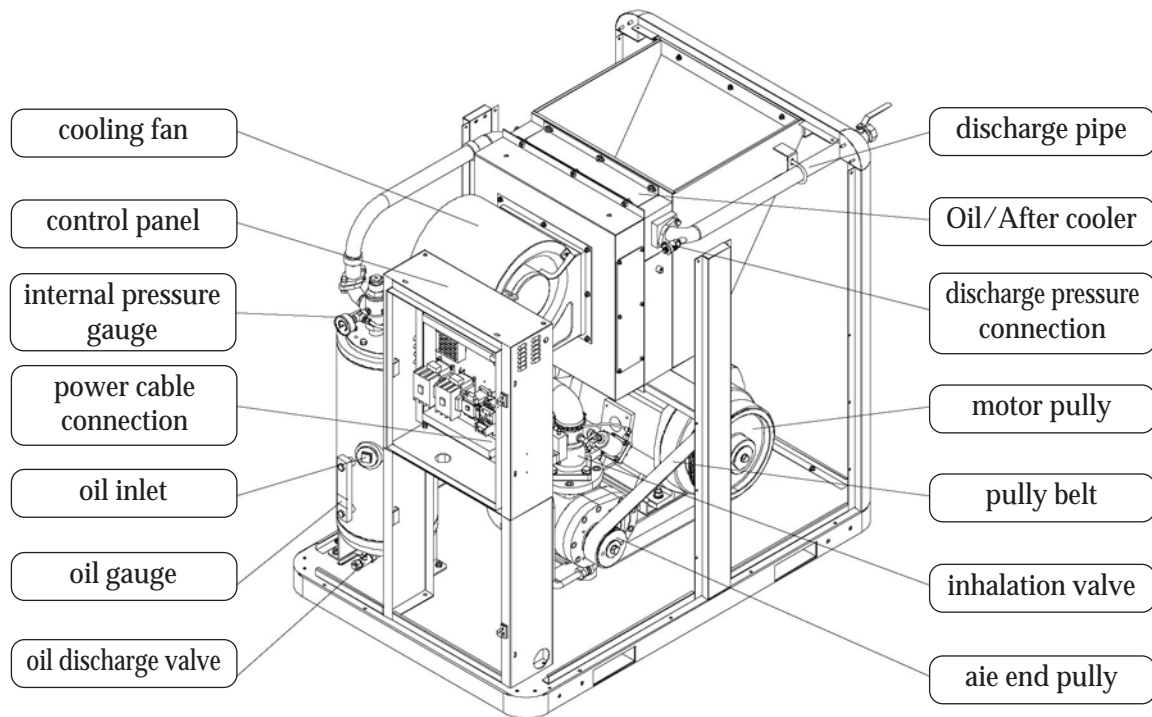
##### Front side



##### Rear side



2. Inside

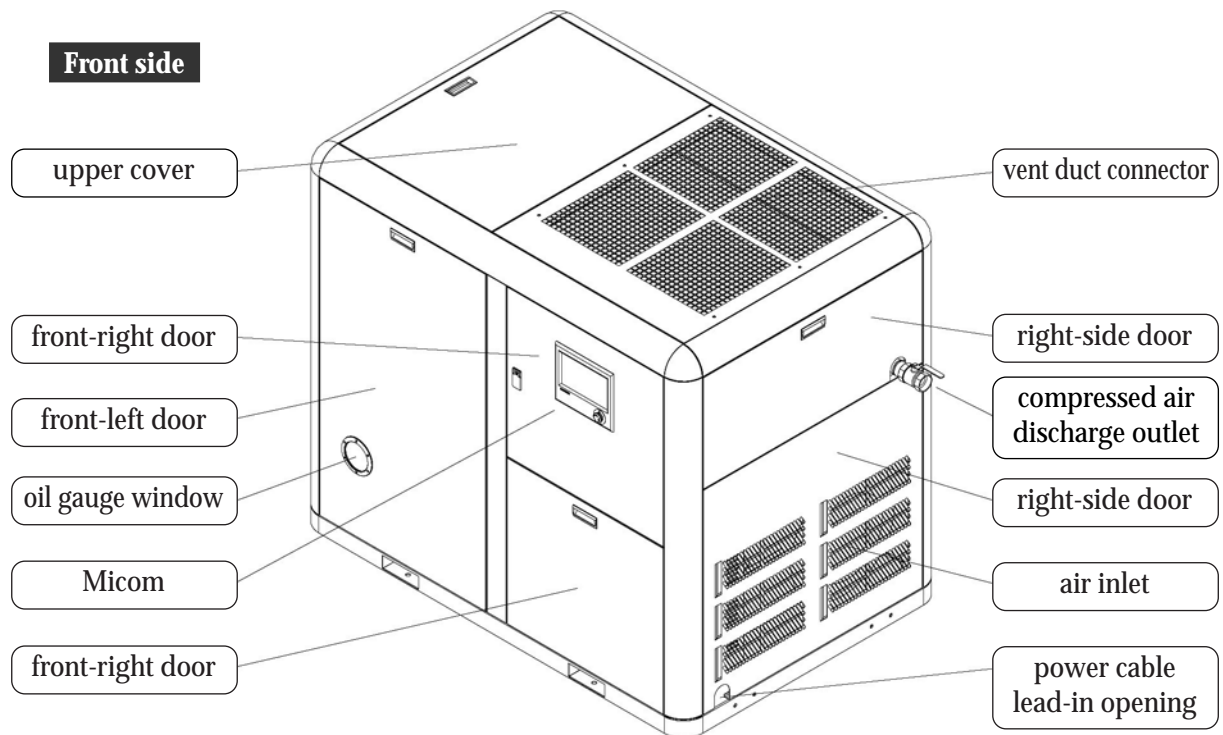


### ■ 2-2 GRH3-75A, 100A

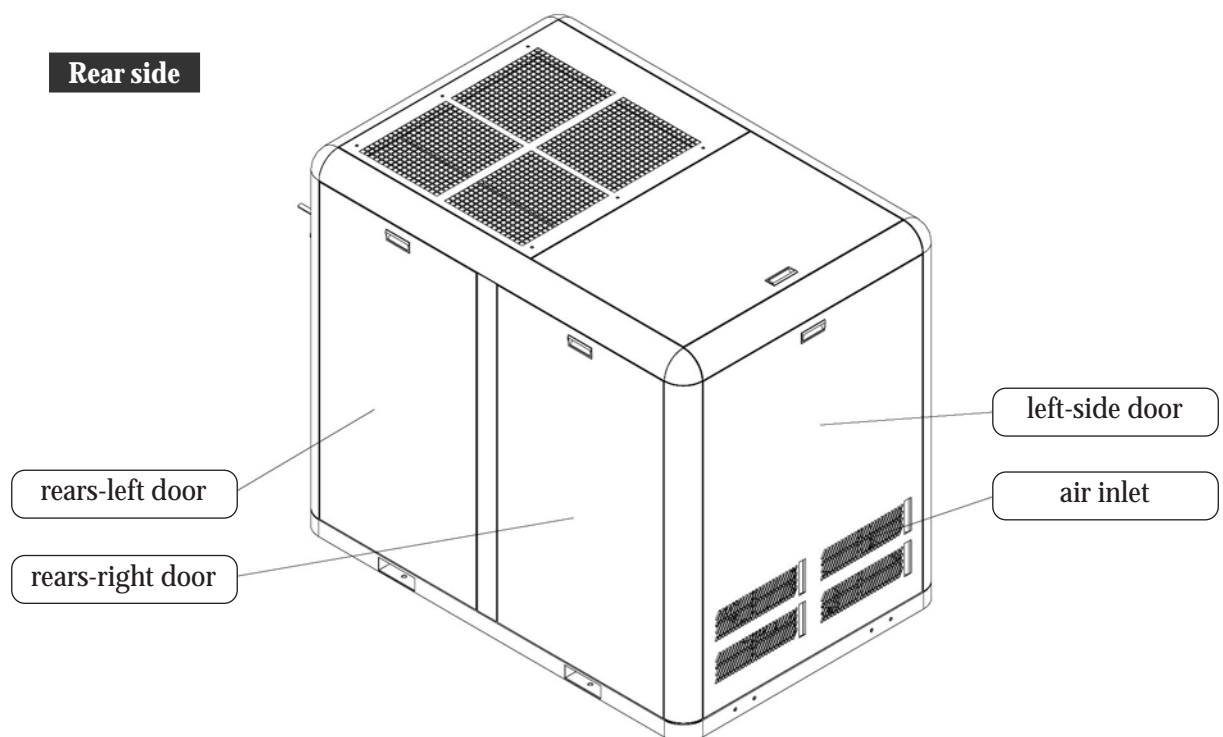
Fully understand the names and functions of parts relating to the routine operation and manage the compressor.

#### 1. Appearance

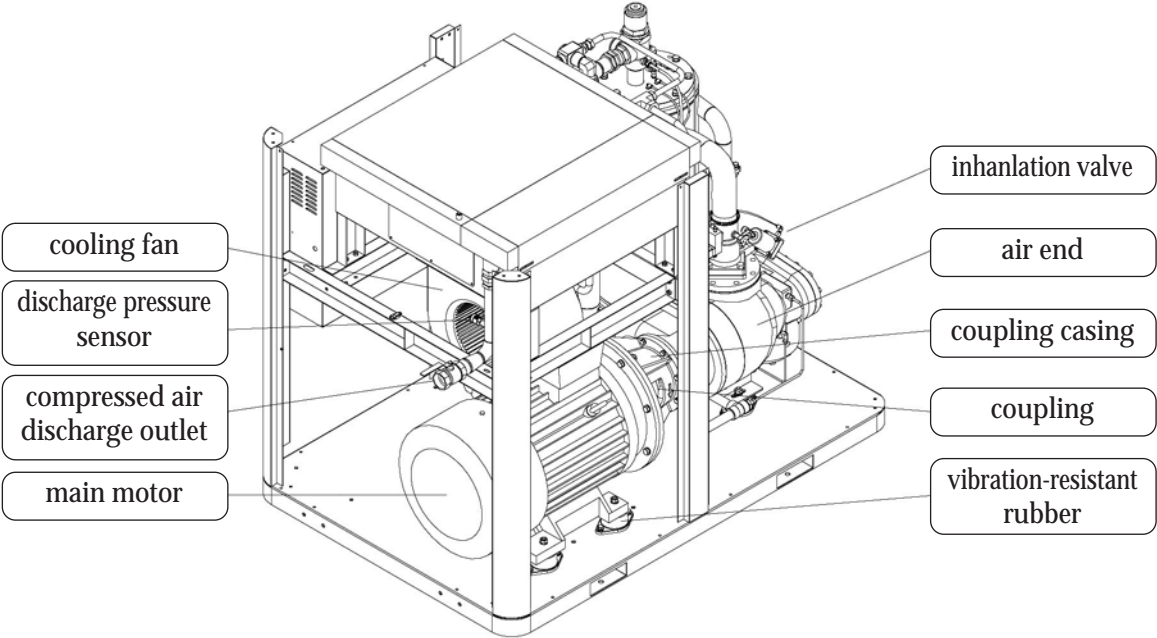
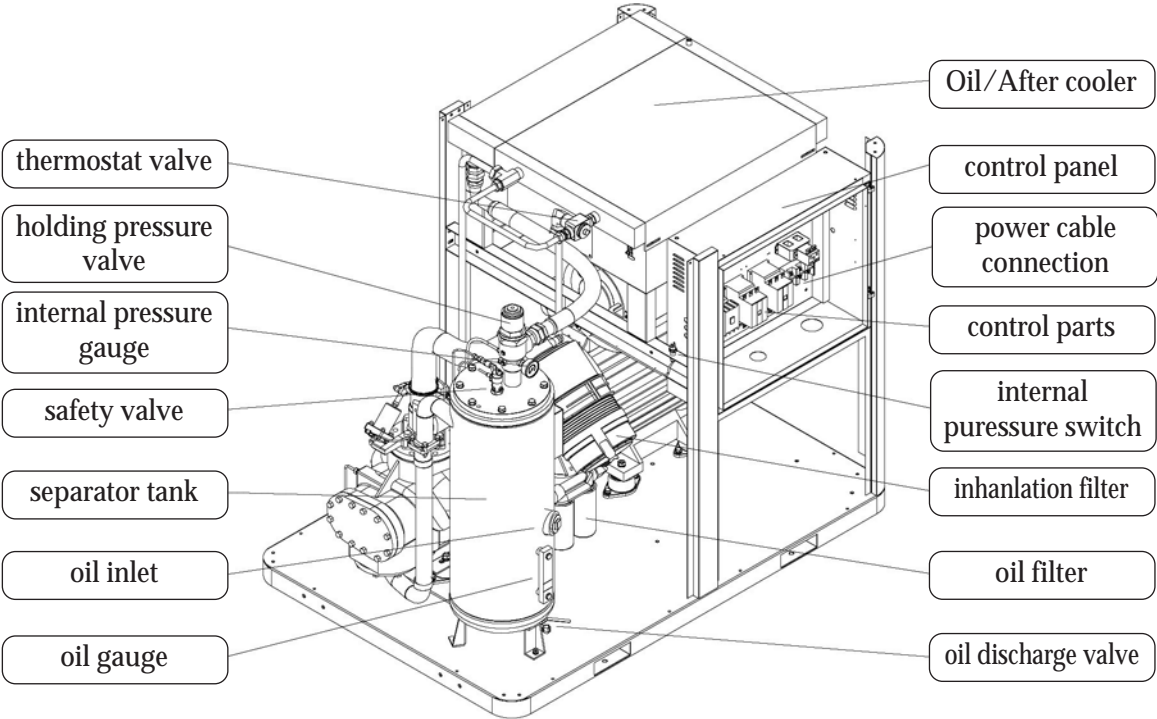
##### Front side



##### Rear side



2. Inside



## 3. Electric Wiring

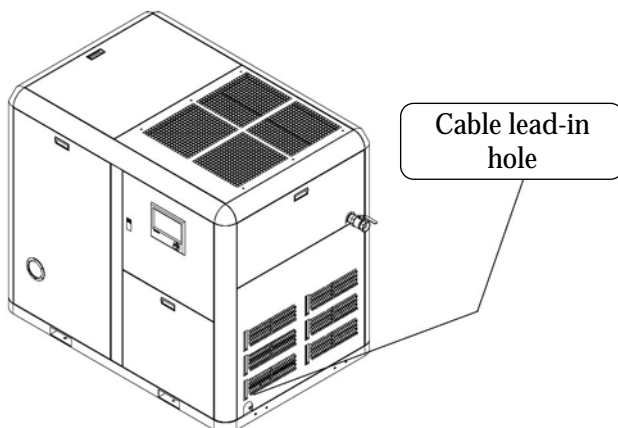
### ■ 3-1 Wiring



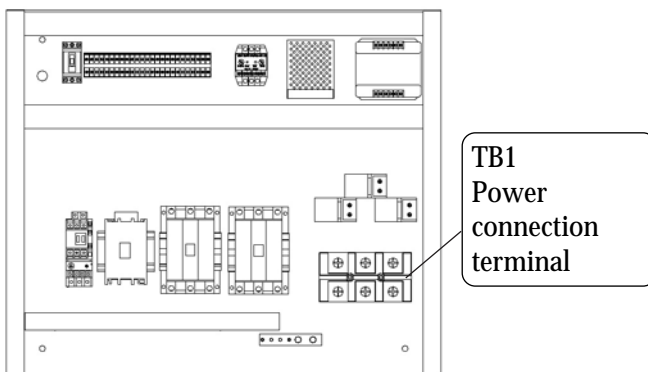
- The lead-in cabling to the compressor should be executed by an competent engineer. Any poor wiring may cause electric shock or other electric fault.
- Do not alter control parts or electric circuits attached to the electric box. The compressor may be damaged due to malfunction of protection.
- When opening the electric box door for routine maintenance or repairs, the main power should be turned off to avoid any electric shock accident.

#### 1. Wiring

The compressor is already wired internally. If opening the front door, you may find a hole for lead-in power cable on the bottom of the right side. Insert a wire into the hole for connection.



If opening the front door, there is TB1. Please connect the power to it.



In case of wiring to the electric box, use rubber bushing to protect the cable sheath and wire it to avoid removal of the sheath.

#### 2. Electric cable specifications.

Use the EV or CV cable for 600V. For the thickness, refer to page 24.

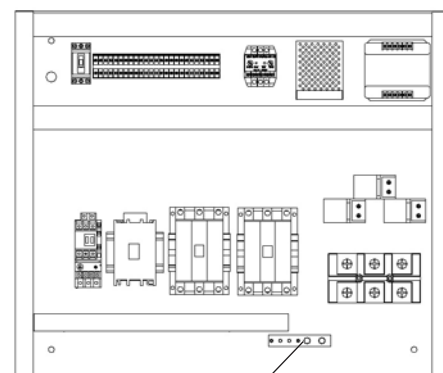
##### Rated current of main motor

Main motor cap.	AC220V	AC380V	AC440V
15(kW)	48A	28A	24A
18(kW)	58A	33A	29A
22(kW)	71A	41A	35A
27(kW)	87A	50A	43A
37(kW)	119A	69A	60A
55(kW)	178A	103A	89A
75(kW)	242A	140A	121A
110(kW)	356A	206A	178A
150(kW)	486A	281A	243A

\* The rated current may vary depending on a motor type.

#### 3. Grounding

Ground in accordance with the KSC Rules. The grounding terminal inside the compressor's electric box is located as presented in the below figure.



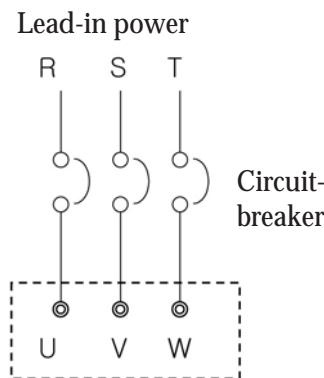


4. Installation of circuit breaker for wiring

Attach a circuit breaker for wiring on the primary power supply of the compressor.  
For the capacity of the breaker, refer to page 24.

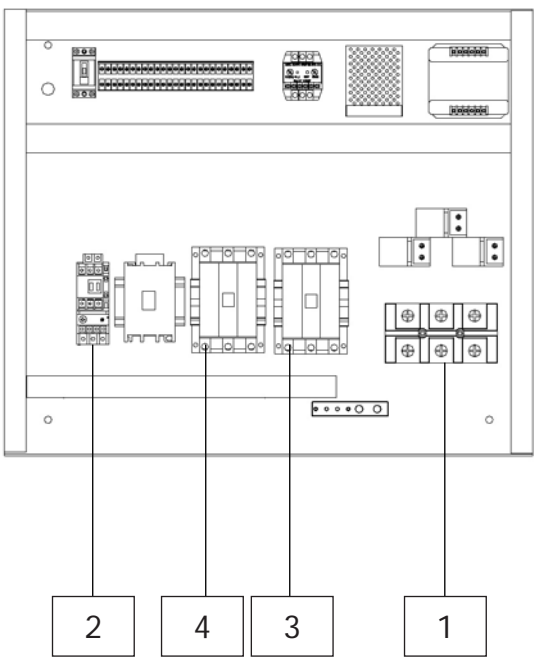
When repairing or maintaining the compressor, make sure to turn it off first.

Example of circuit-breaker wiring.



Connecting to TBI of the compressor's electric box.

5. Routine checkpoints



If any impurities or dust is found inside when visually inspecting it, turn it off and clean it up with compressed air.

Black cable is power cable and the red/white/blue insulation tubes are inserted at the end of it. If the colors of insulation tubes are discolored to black, check the tightness of screws.  
If screws are loosely tightened, it may generate heat, deteriorating cables and probably leading to a fire, so they should be maintained once a month.

Cable checkpoints

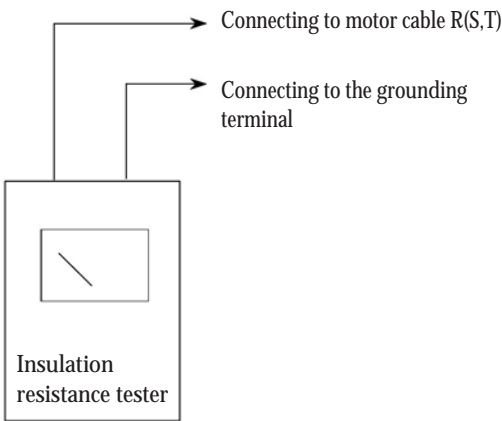
1	Main terminal(TB1)	2	Fan motor magnet
3	Main motor magnet	4	Operation magnet

6. Check motor insulation resistance

Take the following steps if insulation resistance is to be checked, for instance, operation of circuit-breaker.

- 1) Turn off the power of the compressor.
- 2) Set the voltage range of insulation resistance tester lower than 500V.
- 3) How to check the resistance;

Loosen the bolt with **4** (motor's cable) and separate the cable from the terminal.



If it displays 10MΩ and over as the above, it is normal.

#### 3-2 Power Facilities

##### 1. Cable thickness

Since the compressor may not work properly depending on the power facility capacity and the thickness/length of the power cable and it may stop due to voltage dropping of control circuit or defective acceleration of the main motor, make sure to supply the power with the voltage dropping set within 5% of the rated power.

For the cable thickness of the lead-in cable, refer to the following table.

Main motor cap.(kW)		15(18)	22(27)	37
Cable thickness	AC220	14	22	60
(mm²)	AC440	8	14	38

55	75	110	150	180
100	125	200	250	325
60	60	150	200	250

It is recommended that the cable length between a transformer/distribution board and the compressor is 100m and shorter; if longer than the length, the thickness may need reselecting.

##### 2. Grounding Spec.

Grounding specifications are as follows.

Voltage	Grounding type	Grounding resistance
AC220V	Type 3	100Ω and lower
AC440V	Special type 3	10Ω and lower

##### 3. Thickness of grounding cable

Rated current	Cable thickness (mm <sup>2</sup> )
20A and lower	2.0 and thicker
30A and lower	2.0 and thicker
50A and lower	3.5 and thicker
100A and lower	5.5 and thicker
150A and lower	8.0 and thicker
200A and lower	14 and thicker
400A and lower	22 and thicker
600A and lower	38 and thicker



Caution

- Make sure to install a circuit-breaker on the power.
- Please ground the compressor to avoid any damages on the main motor or electric shock accident.

#### 4. Circuit breaker capacity

The main power supply essentially needs a circuit breaker to avoid electric shock and protect the motor.

When selecting a breaker, refer to the following table.

Main motor capacity(kW)	Supply power spec.	Circuit breaker cap.
15	AC220V	ABS103-75
	AC440V	ABS53-50
18	AC220V	ABS103-100
	AC440V	ABS53-50
22	AC220V	ABS103-100
	AC440V	ABS103-60
27	AC220V	ABS103-100
	AC440V	ABS103-75
37	AC220V	ABS203-200
	AC440V	ABS103-100
55	AC220V	ABS203-225
	AC440V	ABS203-150
75	AC220V	ABS403-350
	AC440V	ABS203-200
110	AC220V	ABS403-400
	AC440V	ABS403-250
150	AC220V	ABS603-600
	AC440V	ABS403-350
180	AC220V	ABS803-700
	AC440V	ABS403-400

The above capacity used to select a breaker is available for Inverter and Y-D operating models.



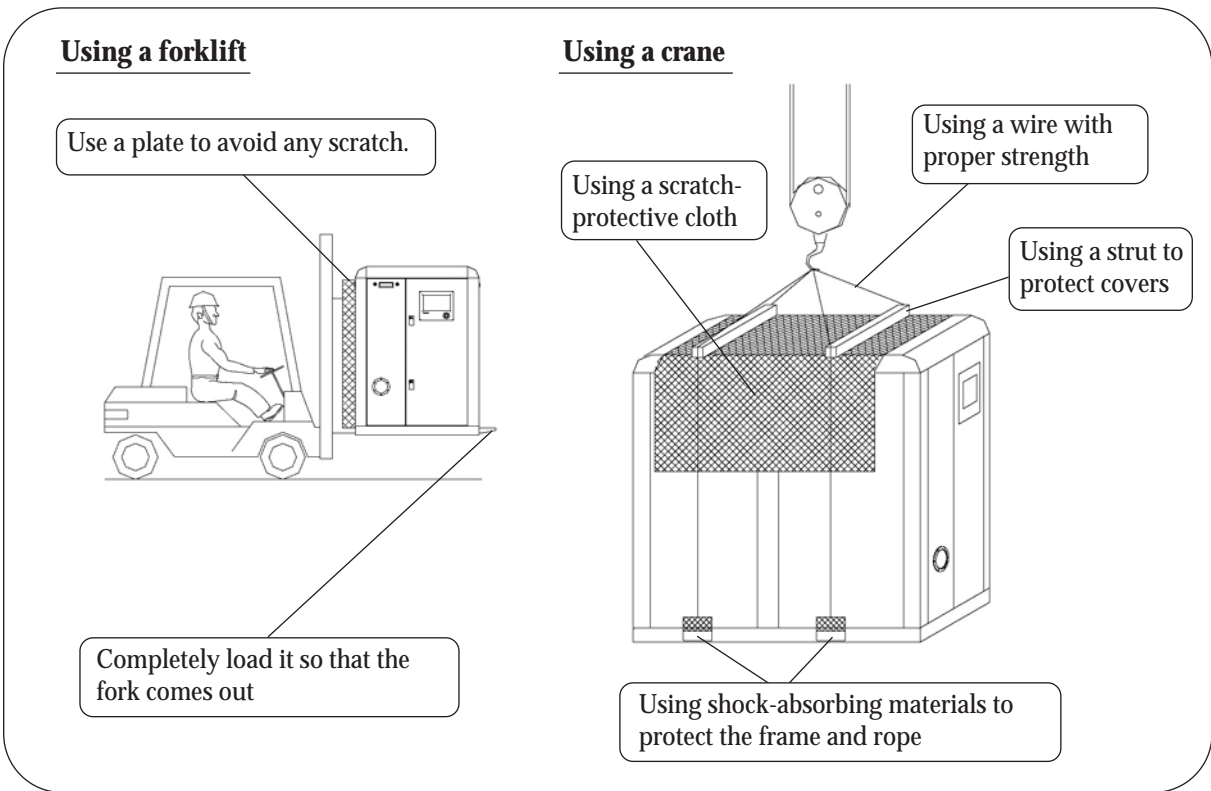
# 4. Installation and Piping

## ■ 4-1 Identification of the product specifications

When accepting and unpacking the compressor, please check the specifications such as pressure, voltage and frequency by using the plate attached on the left side.

- Check whether there is any damage/scratch or transformation on covers during the transportation.

## ■ 4-2 Cautions for Transportation



Weights of compressor models

Model	GRH3-20A	GRH3-25A	GRH3-30A	GRH3-35A	GRH3-50A	GRH3-75A	GRH3-100A
Total weight(kg)	673	700	726	753	940	1596	1713

NOTE> GRH3-75W : 1383kg / GRH3-100W : 1500kg

### 4-3 Cautions for Installation

- The production can be used for a standard life as long as the installation place is well selected.



Caution

- Do not leave any dangerous (flammable) materials around the compressor. It may cause a fire resulting from the heat generated during the operation.
- Do not attempt any work potentially inducing a fire. The flame may be spread into the compressor, possibly damaging the product.

#### 1. Compressor Installation Place

- Install the compressor in a bright, wide and well-ventilated place.

##### Fan

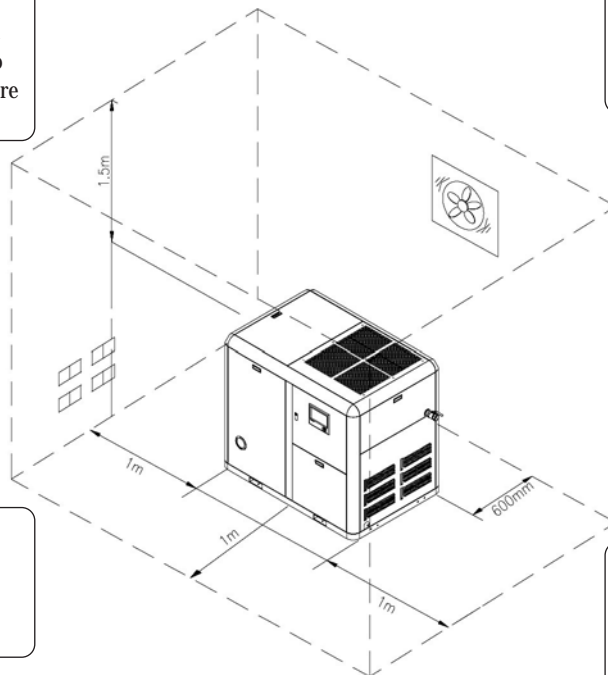
If an installation place is not wide enough, install a fan to limit the ambient temperature lower than 40 °C

##### Piping space

When repairing and maintaining the discharge air pipe, secure a wide space.

##### Air inhalation space

A proper space should be secured to facilitate air inhalation.



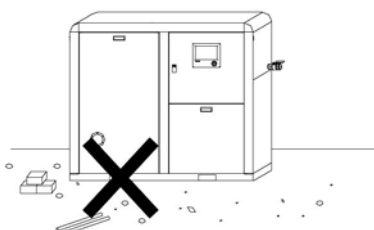
##### Foundation

When installing the compressor in a place with vibration, anti-vibration pad is to be used.

#### 2. Cautions for Installation

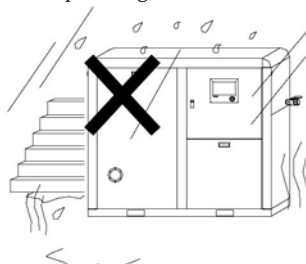
- Install the compressor inside a building free of dust and with low ambient temperature.

Dusty materials such as metals, rock and dust



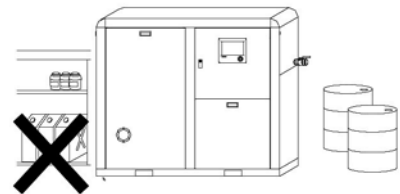
Damaged air end due to deteriorated motor insulation

Raindrop, underground and excessive moisture



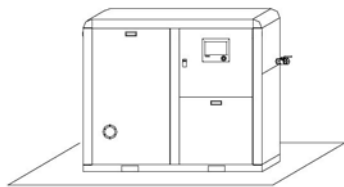
Electric shock, defective motor insulation, malfunction of controller and generation of condensed water and rust

Place with harmful gas

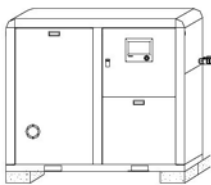


Oxidized lubricant

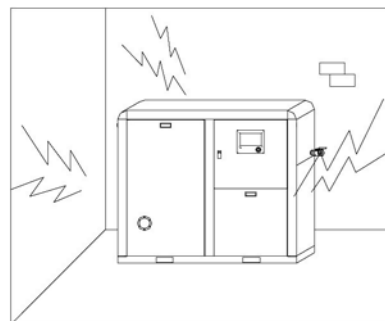
- Install the compressor in a leveled place with little noise reflection



Install it horizontally  
on the ground



Do not use any hard block as  
a strut



Cautious against noise  
reflection from walls



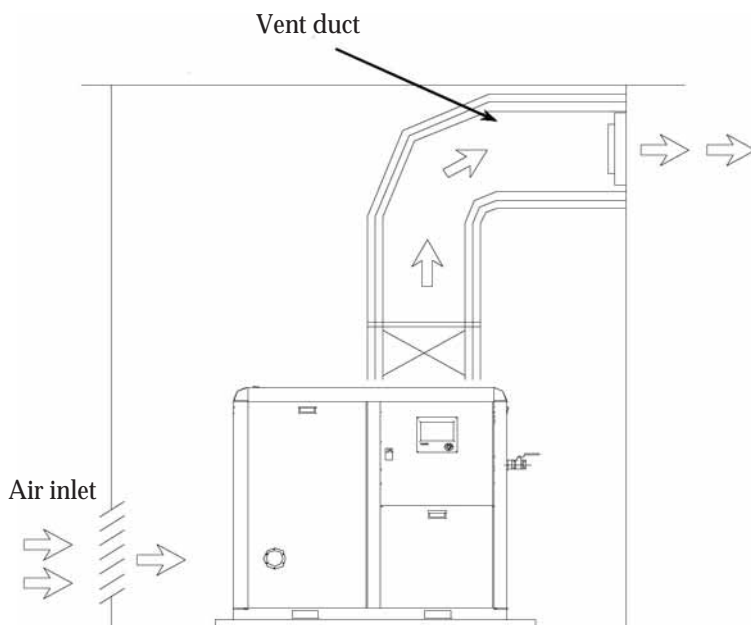
Warning

- Install the compressor indoors only. If the compressor is installed outside, it may cause a trouble due to moisture and dust.
- Install air induction/exhaust pipes in the installation place to ventilate properly. If ambient temperature rises due to the heat from the compressor, it may cause a trouble.

### 3. Ventilation of compressor's room



If the temperature of the compressor's room is higher than the allowable temperature range, install a forced ventilation facility to ventilate promptly. Operating the compressor at 40 °C and higher for a long time may cause a fatal fault.



#### • Air Inlet

Prepare an air inlet larger than 1m<sup>2</sup> per set at a lower place. The air inlet should be protected against dust.

#### • Vent opening

Vent opening is to be installed on the top of a building so that hot air is ventilated to the outside.

#### • Vent duct

When installing a vent duct, make sure to connect it to the compressor cooler's upper vent.

- When installing a vent duct on the compressor, install it in a structure to easily repair and maintain.

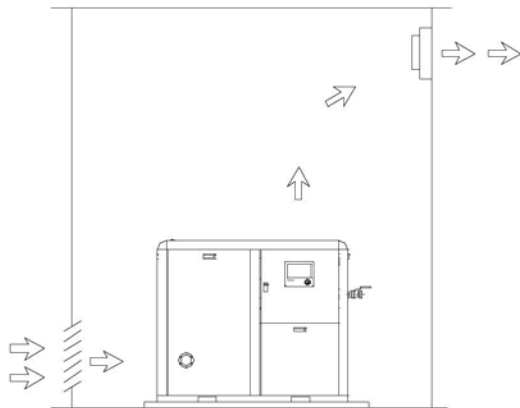
#### Ventilation data

<If vent duct is not installed>

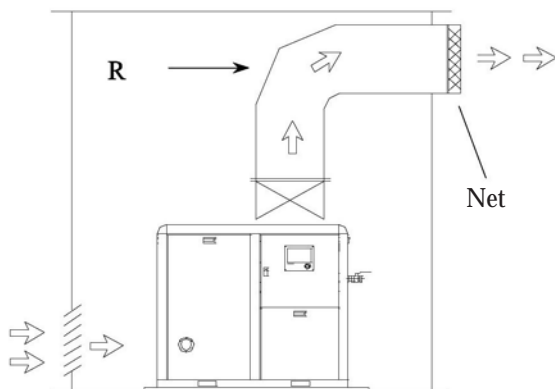
Compressor Model	GRH3-20A	GRH3-25A	GRH3-30A	GRH3-35A	GRH3-50A	GRH3-75A	GRH3-100A
Ventilation vol. (m <sup>3</sup> /min)	105	105	105	105	150	300	300

#### 4. Installation of Ventilator

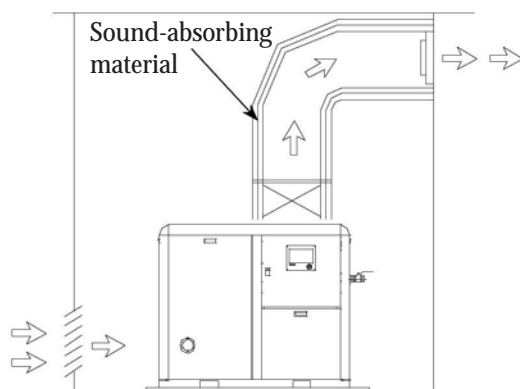
- When installing a ventilator, refer to the following figure.



- If the compressor is installed in an airtight place or a place with lower ceiling, install the air inlet and vent opening as presented in the left figure and attach ventilation fan on the opening.
- Locate the air inlet in a position with little moisture or dust and close to the ground. The opening should be attached to a position well ventilated to the outside.



- When connecting a vent duct to the compressor's cover, do not use a vis and instead, use a tab for the attachment on the compressor's cover.
- When installing a vent duct, install a net and similar devices at the end to prevent birds or impurities from flowing inside.
- Manufacture a vent duct so that R is as large as possible to reduce ventilation resistance.

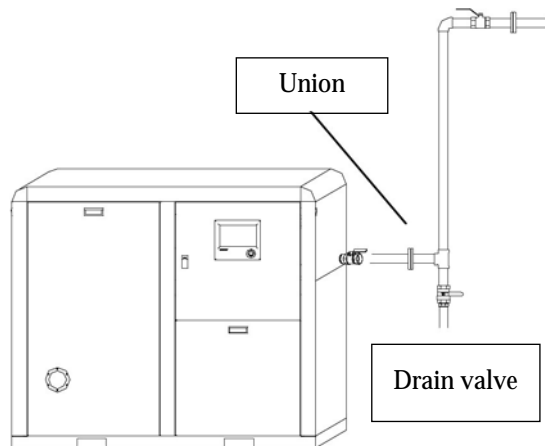


- If any noise is generated from the vent duct, supplement heat-resistant sound-absorbing material inside it.
- Attach the sound-absorbing material tightly.

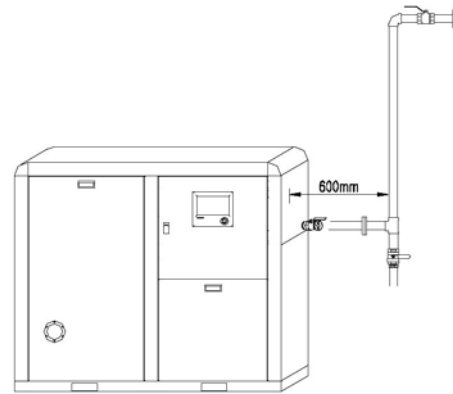
### 4-4 Cautions of Piping

#### 1. General piping

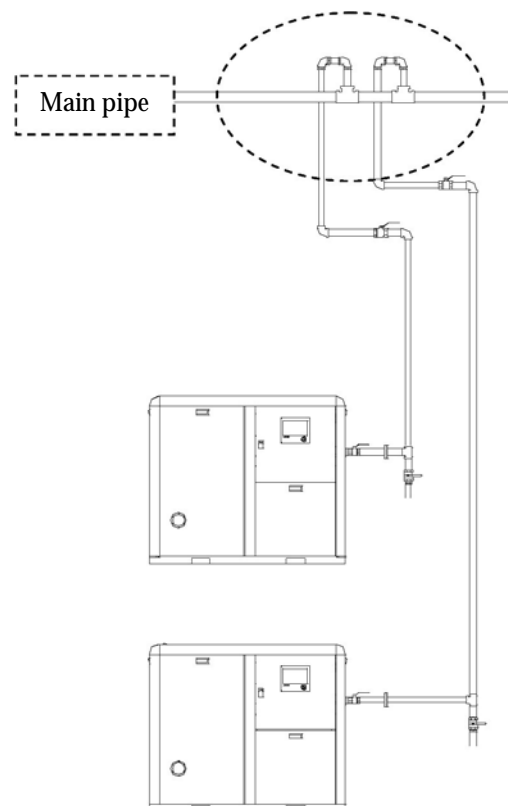
When connecting a pipe to the main air pipe, connect a flange or union to the compressor's discharge pipe to facilitate the repair, maintenance and disassembly of the compressor



5. In case of a vertically upright pipe, give a distance about 600mm and more from the cover surface considering the repair works



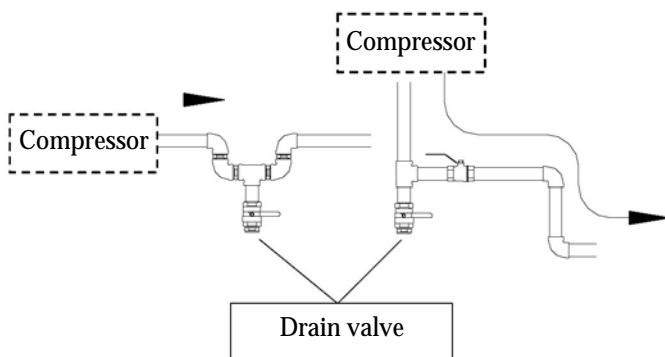
6. In case pipes from compressors join to the main pipe, connect them upright to avoid the backward drain.



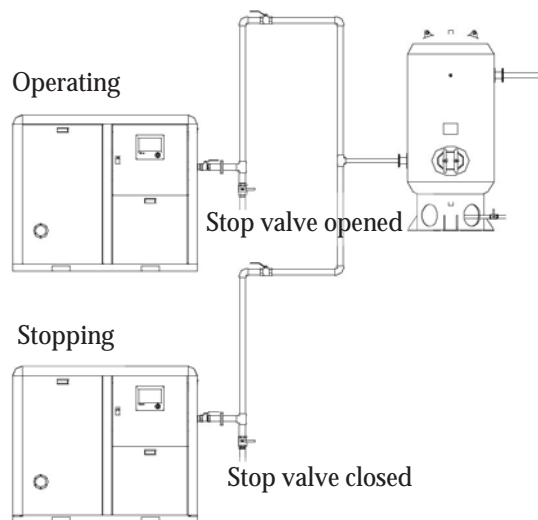
2. By attaching a ball, valve or similar device on the discharge pipeline, make a valve closed when it stops for a long time and prevent moisture from flowing backward

3. If the piping contains a concave or vertically upright pipe, attach a drain valve on the bottom.

4. Open the drain valve when stopping the compressor to discharge the condensed water.

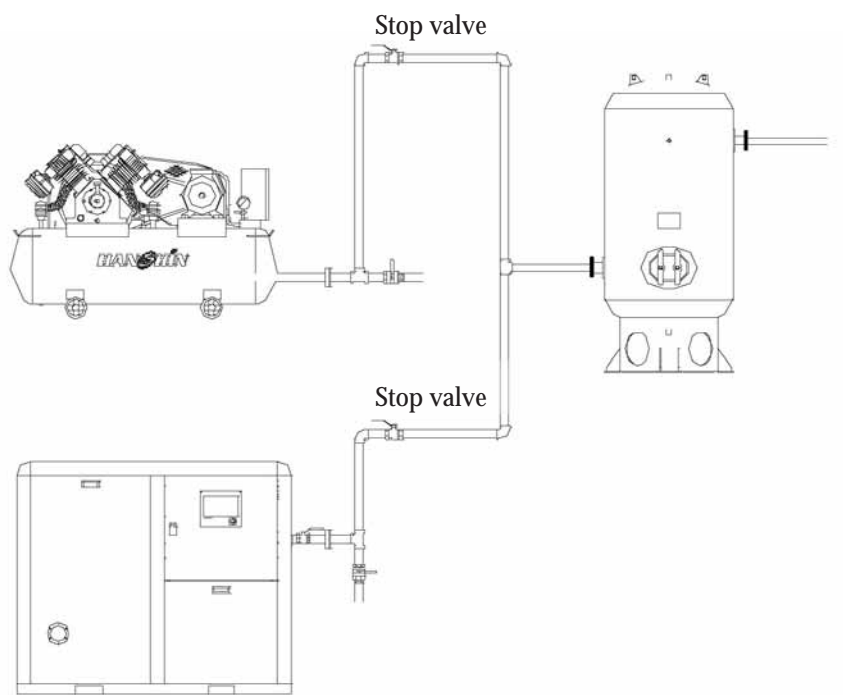


7. Cautions for parallel piping



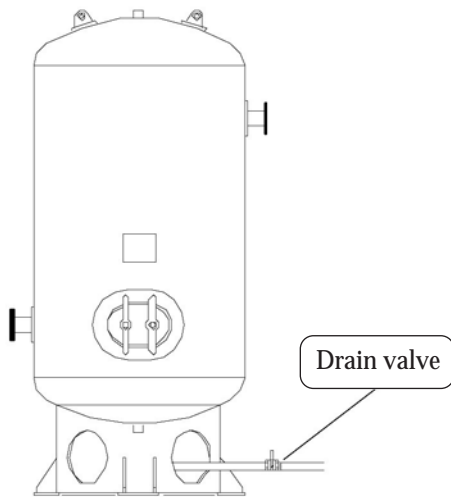
- Completely, close the stop valve of the discharge valve at the compressor that is manually stopped during the operation.
- If opening the stop valve of the suspended compressor, the backward pressure is allowed to After Cooler at the compressor, generating a drain, probably causing rust inside the cooler and check valve and subsequently, reducing the life of the compressor.

8. Cautions for parallel piping



Apply shock-absorbing materials to the reciprocating compressor so that the vibration of reciprocating compressor is not conveyed to the screw compressor, probably generating air leakage.

### 9. Receiver tank



- The drain pipe on the bottom of the receiver tank should discharge the condensed water 4 times and more per week.
- For the capacity of the receiver tank by the compressor capacity, refer to the following table.

Compressor Model	GRH3-20A	GRH3-25A	GRH3-30A	GRH3-35A	GRH3-50A	GRH3-75A	GRH3-100A
Receiver tank cap.(m <sup>3</sup> )	0.4	0.4	0.5	0.6	1.0	1.5	2.0

<The above data can be used to select a capacity depending on the air use conditions>



Caution

Since operating the compressor without the receiver tank may cause frequent loads and no-load pressure pulsation, possibly reducing the life, make sure to install the receiver tank.



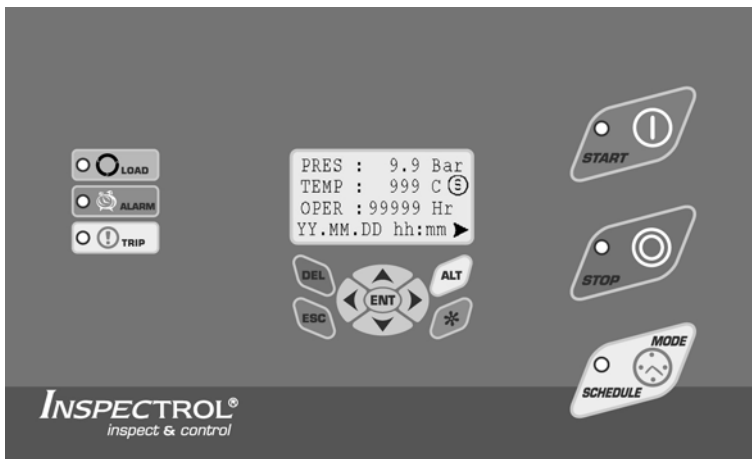
## 5. Operations

### ■ 5-1 Micom Controller

1. Micom Controller consists of LCD display, LED lamps, push button switches and data setting button.

#### Graphic Display

- ④ The operation is graphically displayed.
- ④ The brightness is automatically adjusted, depending on the ambient temperature.
- ④ The bright and clear display facilitates repairs in a dark place.
- ④ If a trip occurs, it shows the location and detail troubleshooting.



#### Start button/lamp

To start operation, press [START] button.

#### Stop button/lamp

The compressor stops after 10-second no load operation if pressing [STOP button]

#### Schedule Operation button/lamp

If pressing [SCH MODE] button, the schedule operation mode is selected. If pressing [START] button after selecting [SCHMODE], it operates in accordance with the setting.



#### Operation data setting/change buttons

Data can be set and changed for optimal operation under any environment by changing the operation data.



#### Load indication lamp No load operation button

The compressor can be easily maintained and checked because green lamp is on in case of load operation and it starts no-load operation if pressing the button.



#### Alarm lamp

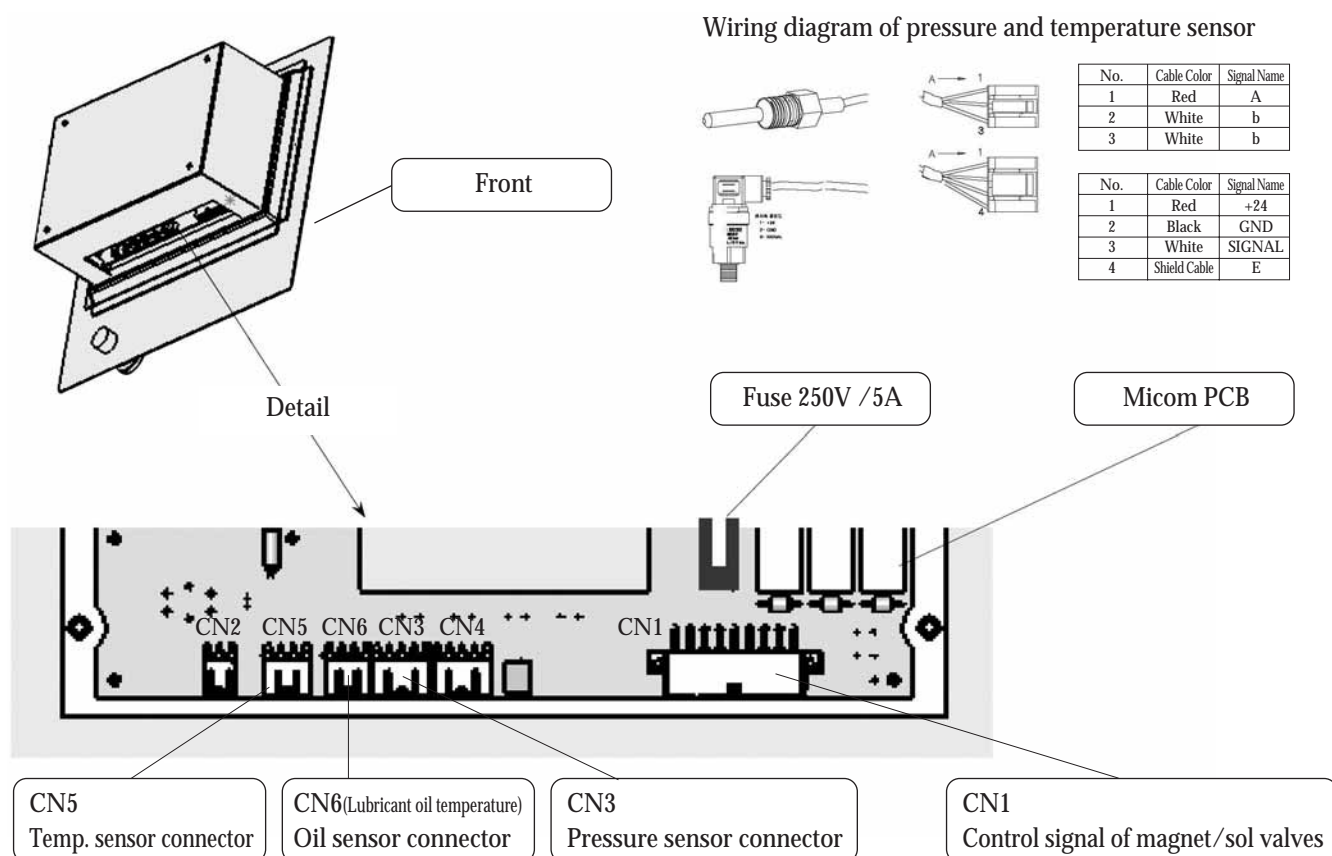
If any alert occurs, the yellow lamp is on and it calculates a parts replacement time automatically, turning on the lamp



#### Trip lamp

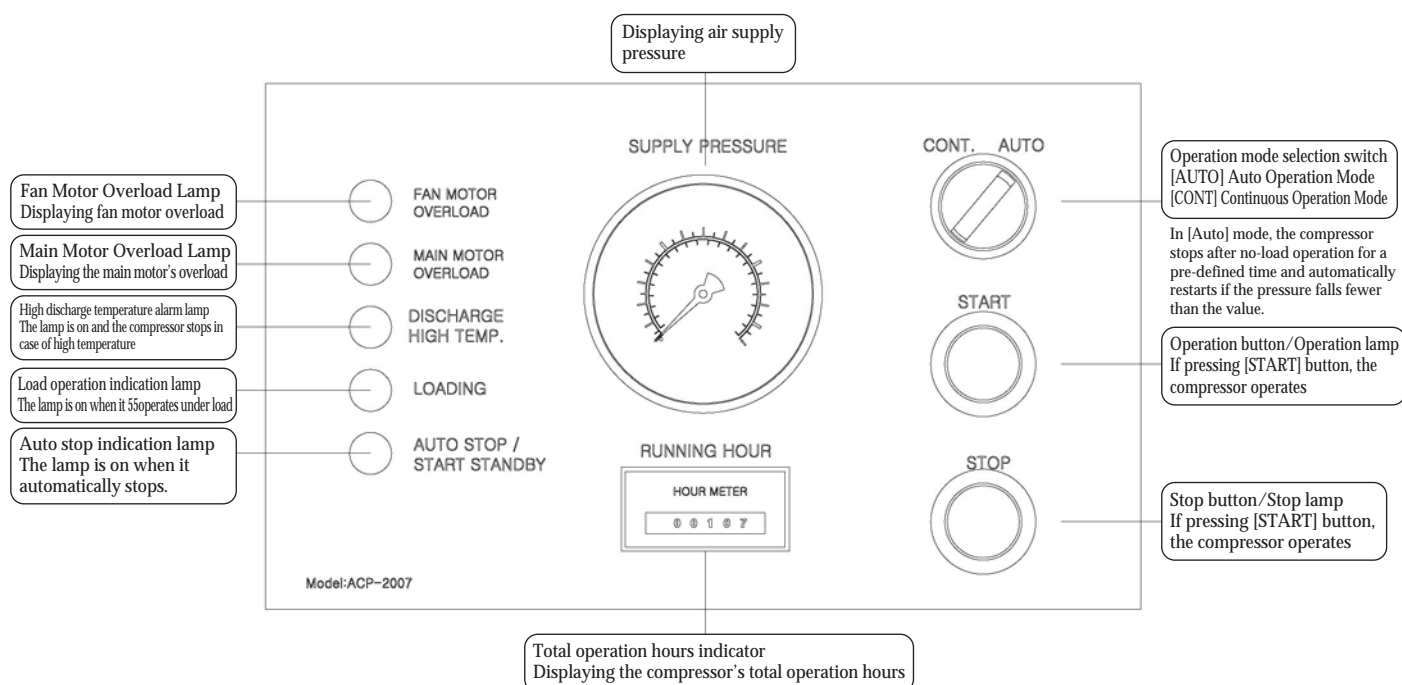
If the compressor stops due to a trip, the red lamp is on.

## 2. Rear view of the Micom Controller



## 3. ACP-2007(Analogue controller)

- GRH3-20A, 25A, 30A and 35A models basically contain an analogue controller. For the functions and operation, refer to the follows.



## 5-2 Operation Control

### 1. Turn on

If it is turned on with the MCB on inside the control box, the controller's main LCD is activated. Micom is self-checked and is readily stand-by for operation.

#### Main Display

```
PRES : 9.9 Bar
TEMP : 999 C (S)
OPER : 99999 Hr
YY.MM.DD hh:mm ▶
```

- Line 1: discharge pressure
- Line 2: discharge temperature
- Line 3: total operation hours
- Line 4: date(YY.MM.DD HH:MM)



This symbol is displayed by schedule operation

If any fault is found in a compressor after turning on Micom, it displays alarm and trip; or, it shows the above display.

### 2. Operation · Stop



To start the operation, press [START] button. Then, [START] lamp is on in red.



To stop the operation, press [STOP] button. Then, [STOP] lamp is on in green.



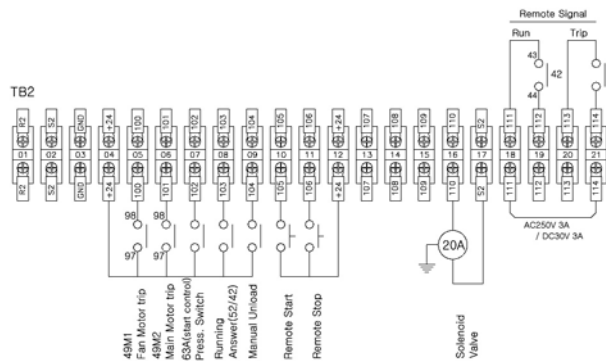
For schedule operation, press [SCHEDULE] button once to select the schedule mode.  
To cancel it, press the button once more.

If pressing [START] button after selecting the schedule mode, a compressor operates and stops in accordance with the pre-defined schedule operation time.  
To suspend it during operation, press [STOP] button.

## 3. Remote Operation

A compressor can be remotely controlled. To control the operation or stop, wire the Start and Stop buttons in TR2 of the electrical box as presented in the figure below.

For the details, refer to page 40.



#### <Remote Operation/Stop>

Basically, the operation/stop control and operating status are configured to be remotely outputted by the contact.

#### Procedures

- 1) Operation and Stop buttons should be connected respectively as seen in the above figure.
- 2) A compressor starts operating if pressing 'Remote Operation' button once.
- 3) If pressing 'Remote Stop' button once, a compressor stops after no-load operation for 10 seconds.
- 4) To remotely check whether a compressor is operating or stops, please use 'remote signal output' terminal.

## 4. Remotely Controlling Load/No-load Operation

- 1) To remotely control load/no-load operation of a compressor, connect the switch as presented in the above TB2.
- 2) No load operation: no load operation is allowed if connecting +24 terminal to 104 terminal.
- 3) Load operation: load operation is allowed if +24 terminal is not connected to 104 terminal.

⚠ The operation/stop can be controlled by Micom's controller even during remote operation.

## 5-3 Initial Operation & Routine Operation

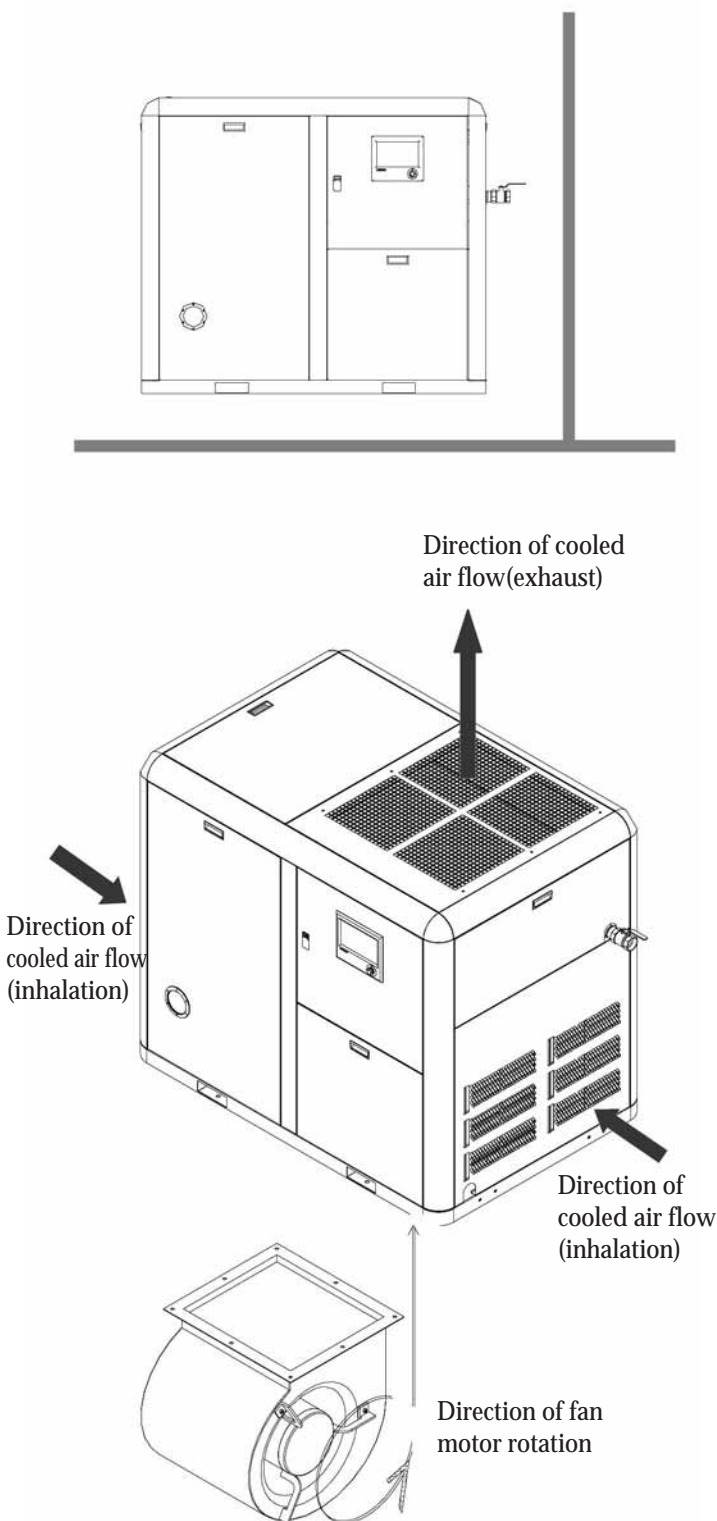
### 1. Initial Operation

#### Before operation

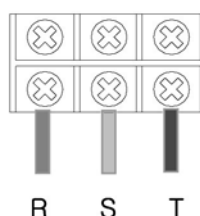
- Check whether the compressor is horizontally installed.
- Check the internal status of oil level and compressor visually.
- Connect the pipe at the compressor's discharge side and open the discharge side valve.
- Check whether the voltage and spec. of the compressor coincide after connecting to TB1 inside the electrical box.
- Keep the surrounding of the compressor tidy.

#### Start

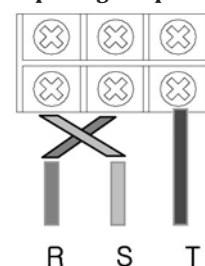
- Turning on the MCCB, allow the power for the control.
- Check whether the [STOP] lamp of the controller is on.
- Press [START] button to start operation.
- Immediately check the rotation direction of air end, stop it by pressing Emergency Stop button in case of reverse direction and replace 2 phases of the wire connected to TB1 by referring to the following figure.



Reverse



Replacing R/S phases



- Press [START] button to restart after the replacement
- Immediately re-check whether the rotation direction of air end is correct.
- Check whether Micom's display shows any rises of pressure/temperature.
- Check whether it generates any abnormal noise.



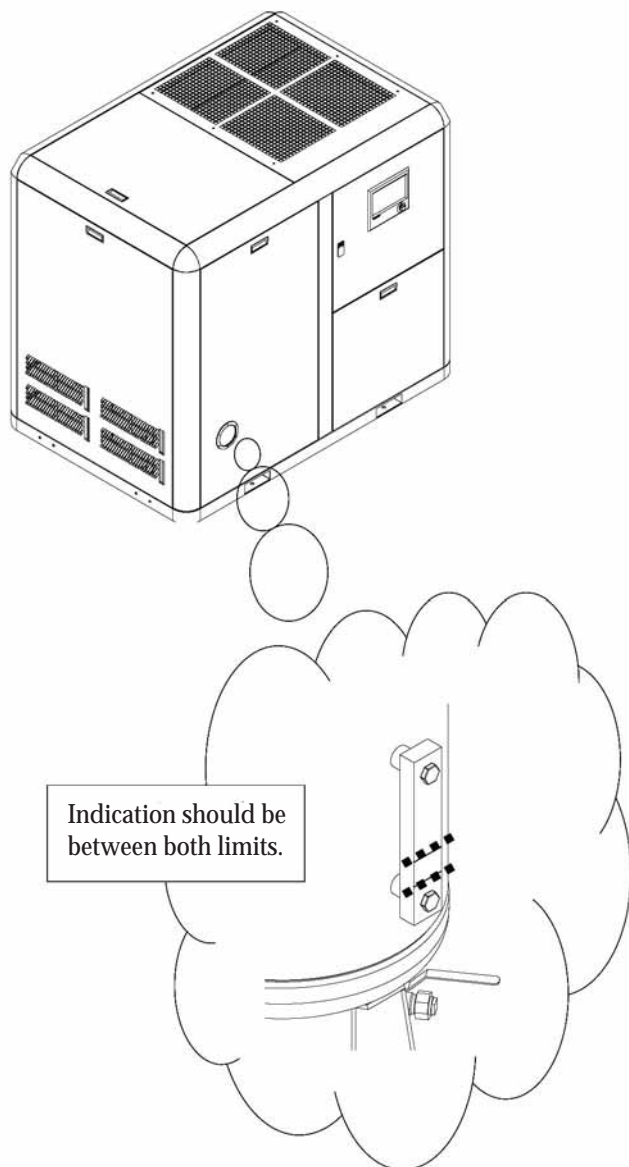
Caution

Make sure to check the direction because reverse rotation for several seconds may cause the damage on the air end.



Caution

Please note that it automatically starts operation in the stand-by modes([P1 HIGH] [P2 HIGH] [AUTO STOP]) if the internal pressure falls.



### During Operation

- Check whether the oil level is between the normal ranges. If insufficient, stop the compressor, check whether the internal pressure is '0' bar and replenish the oil.
- Check whether it operates under the specified pressure.
- While opening and closing the discharge-side valve slightly, check whether it converts between load and no-load operation, depending on the pressure.
- Completely open the ball valve and operate it.
- Manual no-load operation function test  
Press Manual No-Load button to check whether it manually operates under no load. Press it again to check whether it returns to the load operation.
- Auto start test  
If pressing [START] button before the internal pressure falls under 2.0 bar just after stop, it displays [P1 PRESS HIGH]; if the internal pressure falls under 2.0 bar, check whether it automatically starts.
- Stop  
Press STOP button and it stops after 10-second no-load operation.

### Stop procedure

[STOP] button on → No load operation → Discharging the internal pressure → Auto stop in 10 seconds.

If not using it for a long time, turn off the main power or press Emergency Stop button to cut off the control power.



Caution

Before the internal pressure is discharged under 2.0 bar just after stop, press [START] button. Then, [P1 PRESS HIGH] message is displayed. Please note that it automatically starts if the internal pressure is lower than 2.0 bar.

## 2. Routine Operation

- Opening the front cover, check whether the compressor has any impurities or oil leakage. Then, open the electrical box door and visually inspect the tightness of power cable(black). Since the power cable is loosely connected, discoloring the red/white/blue color tubes, turn it off and re-check the cable.



### Operation

Press [START] button to start it.

During operation, check the oil level. If insufficient, stop the operation and replenish the oil.



### Stop

If pressing [STOP] button, it stops after 10 second no-load operation. If pressing it again when it stops by [STOP] button, it immediately stops.

- If the P2 pressure is not formed 2.0 bar and higher in 10 minutes of the operation, it generates [P-SENSOR TROUBLE] and stops, so check the inhalation valve opening, slightly close P2 side ball valve and operate it.

☞ If the P2 side pressure is completely discharge to the air during the operation, the pressure is '0' bar, so at the moment, [P-SENSOR TROUBLE] message is displayed.

- When it stops for a long time, close the discharge side ball valve to prevent any reverse flow. In addition, press Emergency Stop button or turn off the main power, avoiding any safety accident.

#### <NOTE>

P1: internal pressure of the compressor  
P2: end pressure of the compressor

- When changing the operation conditions such as operation pressure, refer to page 49.

The initial values of operation pressure are as follows.

<Compressor's pressure spec.: 7.0bar>

Item	Code	Initial value
Diff. pressure	AR02	1.0bar
Operation pressure	AR03	7.0bar
Auto restart pressure	AR05	1.0bar
Y-D switchover time	T01	5.0Sec
Auto stop time	T02	10 minutes

When the above pressure is set, It operates under no-load if it is higher than 7.0bar or under load if it is 6.0 bar and lower(AR03 - AR02).

When changing operation pressure, other operation data will be automatically changed for the optimal operation.

#### <NOTE>

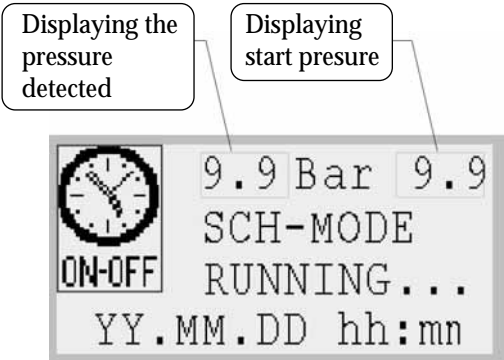
How to reset: press [STOP] button. If any trouble occurs during operation, it immediately stops. Then, check trouble causes, take a corrective measure and press [STOP] button to release the trouble.



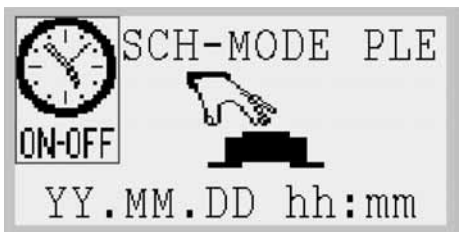
■ 5-4 Schedule Operation

1. Check and enter the schedule operation time.

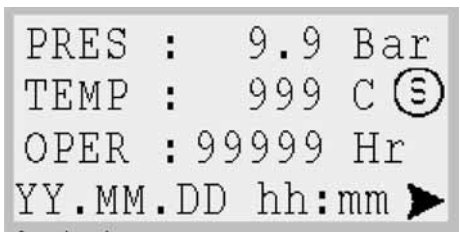
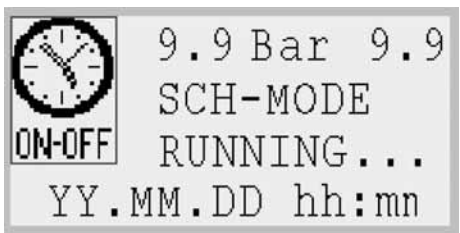
For the directions, refer to page 49.



2. If selecting Schedule mode by pressing Schedule operation mode button once, the following screen is displayed.



3. If pressing START button, it shows the following screen and the compressor operates and stops in accordance with the schedule operation time.



**Schedule operation stand-by screen**

During schedule operation: the screen is displayed when the compressor is stand-by before the schedule operation time

**Schedule operation screen**

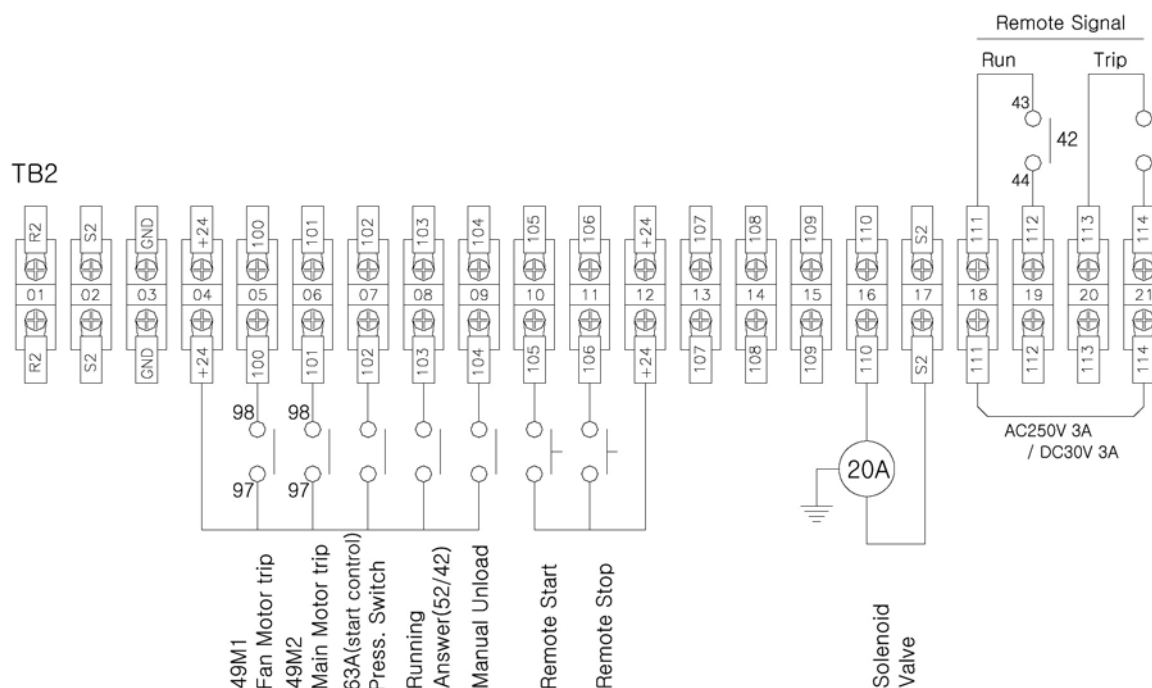
During schedule operation: if the compressor operates at the time of schedule operation, the left screen is displayed.

When the main motor rotates by schedule

operation,  mark blinks.

## 5-5 Remote Operation

It is basically structured so that the remote operation, stop control and operation status are outputted to the contact. Just attach the Start and Stop buttons as presented in the below figure.



### 1. Remote Operation

It operates if turning on No.10 terminal(105) and No.12 terminal(+24) once.

### 2. Remote Stop

It stops if turning on No.11 terminal(106) and No.12 terminal(+24) once.

### 3. On contact during operation

During operation, No.18 terminal(111) and No.19 terminal(112) are on.

### 4. On contact if any abnormal status

If any trouble occurs, No.20 terminal(113) and No.21 terminal(114) are on.

### 5. Remote manual no-load instruction terminal

If No.04 terminal(+24) and No.09 terminal(104) are on, it operates under no load and when they are off, its pressure is automatically controlled.



■ 5-6 Remote Monitoring System [Micom]

When it is necessary to remotely monitor compressor operation, stop and operation status, using [Remote Monitoring Control System] may facilitate the management of the compressor. It is structured as follows.

<Specifications>

Dimensions: 320(W) x 270(H) x 120(D)

Power Supply: AC220V Single Phase 50VA

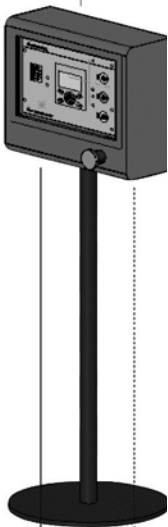
Connection Control Cable: UTP Lan Cable 1 cable

Every situation displayed on the compressor Micom such as compressor operation temperature, discharge pressure, filter use time and troubles is displayed on the remote monitoring system(remote controller).

i.e.) Operation status display screen

PRES : 9.9 Bar	a S:9999 L:99999
TEMP : 999 C	Air F: 9999 Hr
OPER : 99999 Hr	Oil F: 9999 Hr
YY.MM.DD hh:mm	Oil S: 9999 Hr
<b>STOP</b> FAN MOTOR pxx	<b>STOP</b> INVERTER pxx
<b>TRIP</b> OVER LOAD	<b>TRIP</b> ERROR STOP
CHECK! FAN MOTOR	INVERTER BOX OPE
<b>STOP</b> ANSWER pxx	<b>STOP</b> 999 C pxx
<b>TRIP</b> SIGNAL OFF	<b>TRIP</b> DISCH.TEMP
CHECK! INVERTER	110* OVER
	CHECK! OIL LEVEL

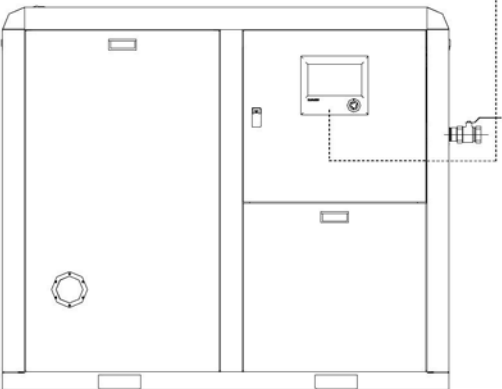
Remote Controller



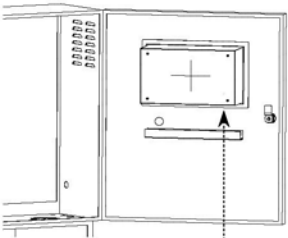
AC220V power supply

UTP(LAN) cable 1 line connection

Compressor



UTP cable connection position with in Micom



COM connect

### ■ 5-7 Remote monitoring System [Computer]

When remotely monitoring compressor operation, stop control and operation status, using [Remote Monitoring Control System] may facilitate the control of the compressor, it is structured as follows.

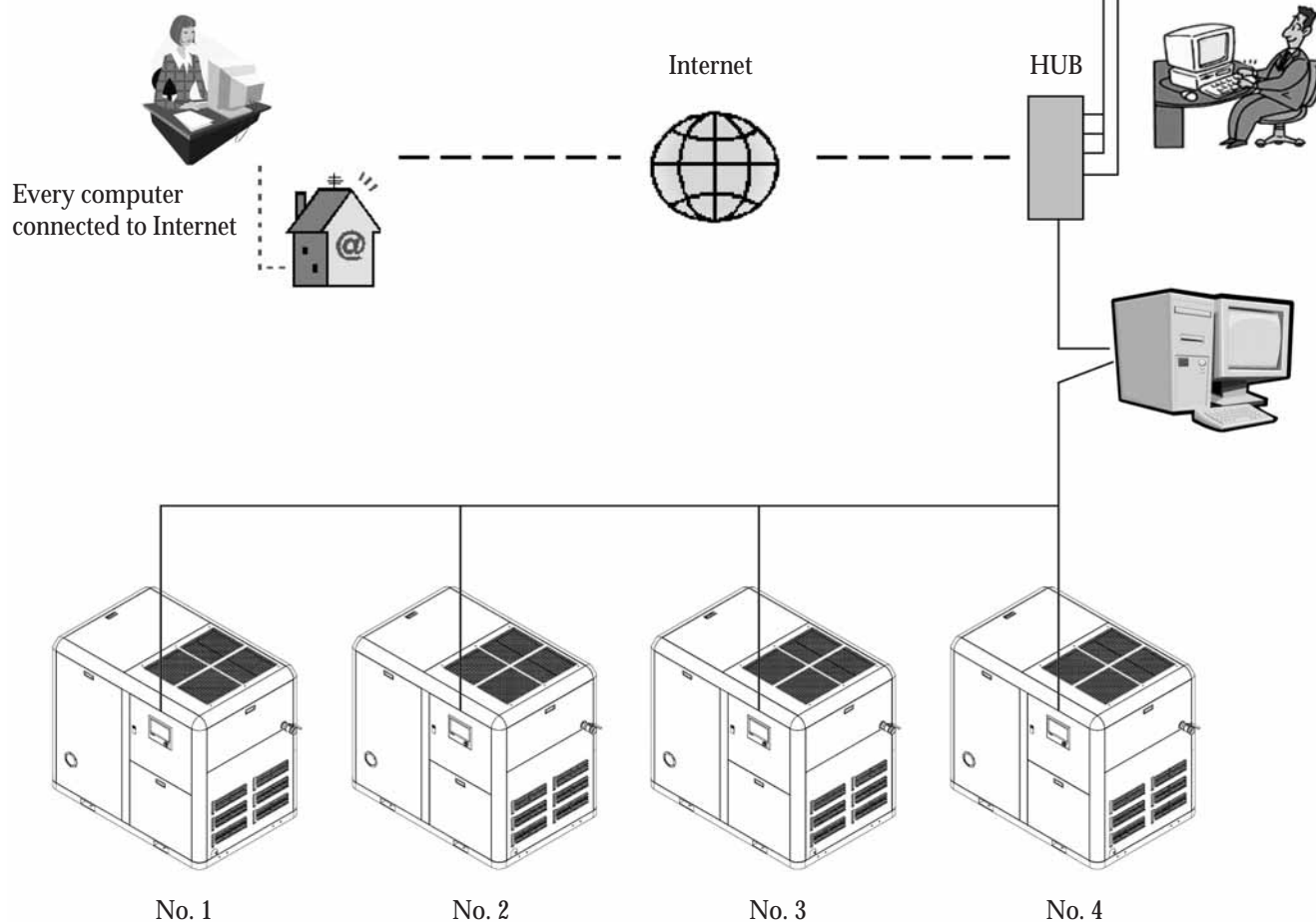
Components: computer, COM card[computer], COM cable

No. of controlled sets: 8

#### Computer monitor



Every computer connected on LAN

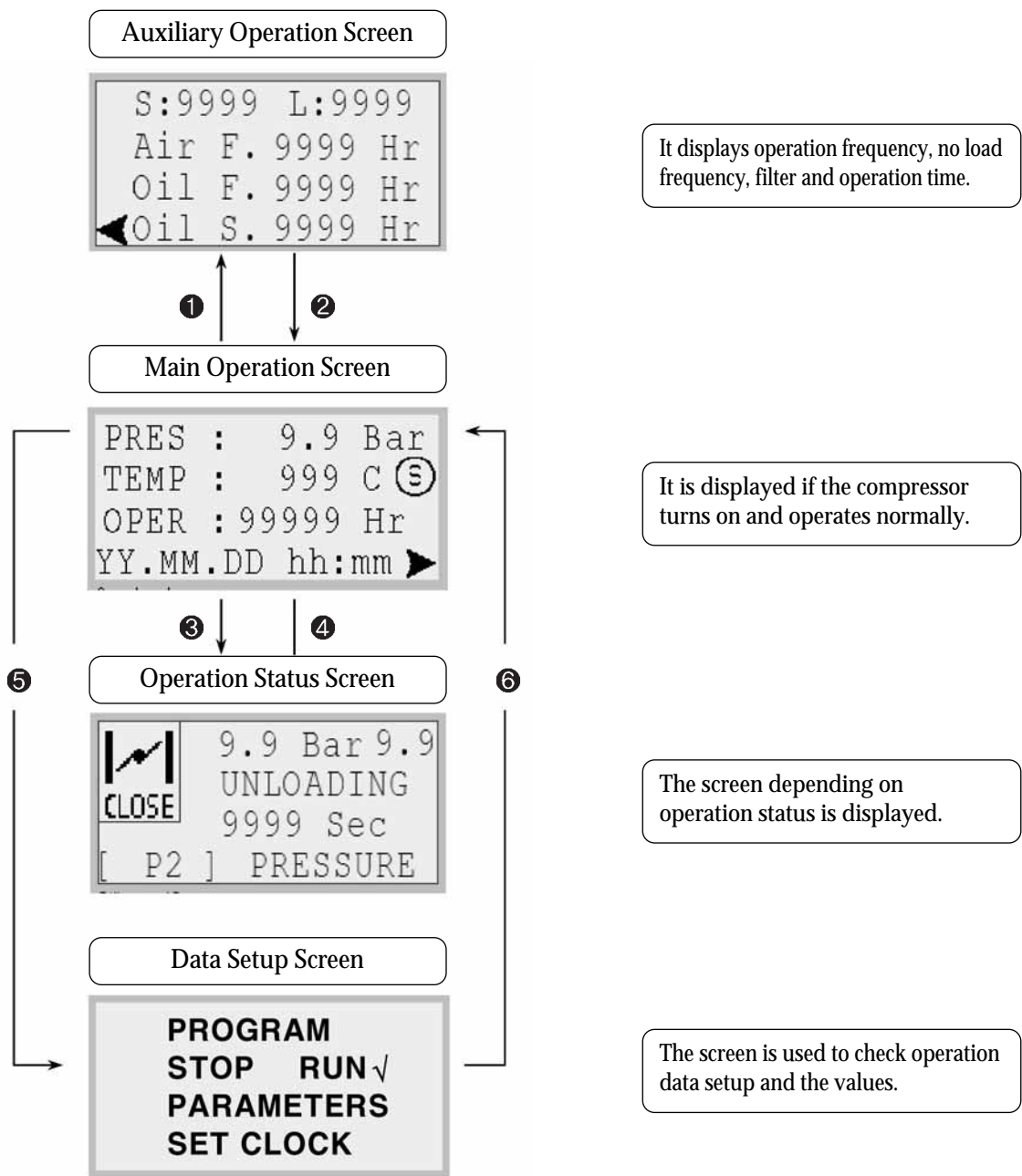


■ 5-8 Micom Display Configuration & Operations

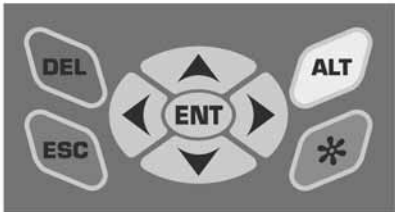
1. Display Configuration

Micom display consists of 4 screens; main operation screen, auxiliary operation screen, operation status screen and data setup screen.

2. Screen Operation flow



- ❶ Press [ ▶ ] button to convert
- ❷ Press [ ◀ ] button to convert.
- ❸ It is automatically converted by operation status
- ❹ It is automatically converted if releasing, if any, a trip
- ❺ It is converted by pressing [ \* ] and [ENT].
- ❻ It is converted if pressing [ESC] and [ \* ].



## ■ 5-9 Operation Data Setup and Check

### 1. Operation Display

```
PRES : 9.9 Bar
TEMP : 999 C (S)
OPER : 99999 Hr
YY.MM.DD hh:mm ▶
```

#### [Main Screen]

Display discharge pressure / discharge temp. /total operation time  
To go to the auxiliary operation screen, press [ ▶ ] button.

PRES : 9.9 - operation pressure display  
TEMP : 999 - discharge temperature display  
OPER : compressor's total operation hours

```
S:9999 L:9999
Air F. 9999 Hr
Oil F. 9999 Hr
◀Oil S. 9999 Hr
```

#### [Auxiliary Screen]

Display the motor start frequency and load/no-load operation conversion frequency.  
To go to the main screen, press [ ◀ ] button.

S : 9999 - Motor start frequency L : 9999 - Load/no-load conversion frequency  
Air F. - Air filter use time  
Oil F. - Oil filter use time  
Oil S. - Oil separator use time

```
STOP pxx
TRIP FAN MOTOR
OVER LOAD
CHECK! FAN MOTOR
```

#### [Fan Motor Trip Display]

When the compressor stops due to fan motor fault  
“pxx” troubleshooting page is displayed  
Refer to page 52 and control circuit: trip occurs when No.5 terminal of TB2, 97-98 is on

**Checkpoint : 49M1 settings, fan motor and etc**

```
STOP pxx
TRIP MAIN MOTOR
ERROR
CHECK! EOCR[ 49M
```

#### [Main Motor Trip Display]

When the compressor stops due to main motor fault  
“pxx”troubleshooting page is displayed  
Refer to page 52 and control circuit: trip occurs when No.6 terminal of TB2, 95-98 is on

**Checkpoint : 4EOCR , main motor, air end, pressure setting**

```
STOP pxx
TRIP 42 ANSWER
SIGNAL OFF
CHECK! MC42 AUX
```

#### [Abnormal Operation Signal , Trip Display]

When the compressor stops due to abnormal operation signal  
“pxx”troubleshooting page is displayed  
Refer to page 53 and control circuit: trip occurs when No.8 terminal of TB2, 13-4 is not on after the start.

**Checkpoint : 42 magnet aux. contact point, electrical wiring diagram(drawing)**

```
STOP 999 C pxx
TRIP DISCH.TEMP
110* OVER
CHECK! OIL LEVEL
```

#### [Excessive discharge temp., Trip display]

When the compressor stops due to excessive discharge temp.  
“pxx” troubleshooting page is displayed  
Refer to page 52 and control circuit: trip occurs when the discharge temperature rises over 110 °C

**Checkpoint : oil level, oil cooler, tem. Sensor and etc**



#### [Abnormal Temp. sensor, Trip display]

When the discharge temperature detection sensor is in trouble  
 "pxx" troubleshooting page is displayed  
 Refer to page 53 and control circuit

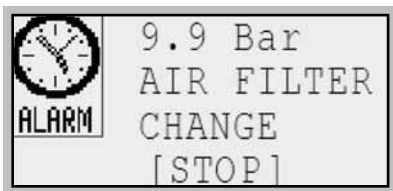
**Checkpoint :** temperature sensor, temperature sensor wiring



#### [Abnormal pressure sensor, Trip display]

When the discharge pressure control sensor is in trouble  
 "pxx" troubleshooting page is displayed  
 Refer to page 53 and control circuit

**Checkpoint :** pressure sensor, pressure sensor wiring



#### [Air filter displacement display]

When the air filter use time reaches to the replacement limit(setting)  
 Initial setting : 3000 hrs

#### **Checkpoint :** filter replacement and use time reset

If pressing [STOP] button for 10 seconds, [RESET ! OK] message is displayed and the use time is reset.

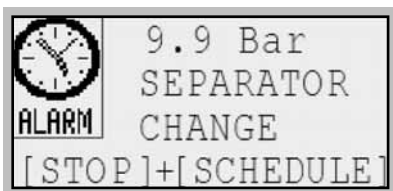


#### [Oil Filter replacement display]

When the oil filter use time reaches to the replacement limit(setting)  
 Initial setting: 3000 hrs

#### **Checkpoint :** filter replacement and use time reset

If pressing [SCHEDULE] button for 10 seconds, [RESET ! OK] message is displayed and the use time is reset.

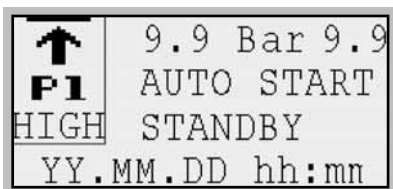


#### [Oil Separator replacement display]

When the oil separator use time reaches to the replacement limit(setting)  
 Initial setting : 3000 hrs

#### **Checkpoint :** filter replacement and use time reset

If pressing [STOP] and [SCHEDULE] buttons for 10 seconds, [RESET ! OK] message is displayed and the use time is reset.

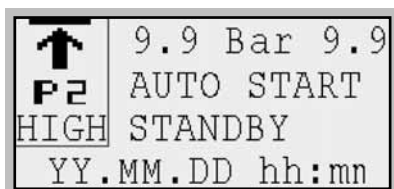


#### [Internal pressure rise auto start stand-by display]

If the internal pressure[P1] is 2.0 bar and higher after pressing [START] button, the auto start stand-by display appears.

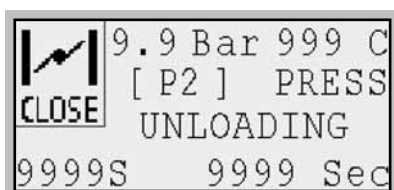
If the internal pressure falls under 2.0 bar, it automatically starts.





### [Line pressure rise auto start stand-by display]

Auto start stand-by display when the compressor's internal pressure [P2] is higher than the setting after [START] button. It automatically starts when P2 pressure falls under 6.0 bar.



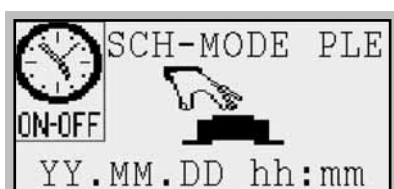
### [No load operation display]

No-load operation when the pressure rises higher than the no-load start pressure due to reduced air volume. It operates under no-load for the set time(10 minutes) and automatically stops.



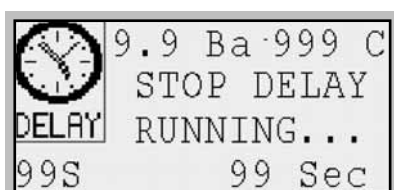
### [Auto stop display]

When the compressor automatically stops under no load operation  
It automatically starts if the pressure falls under the preset pressure (6.0 Bar).



### [Schedule Operation selection display]

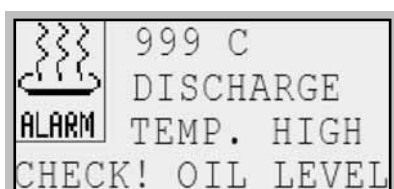
When pressing schedule operation button  
If selecting the schedule operation mode and pressing START button, it operates and stops according to the predefined time.



### [Stop delay operation display]

If pressing STOP button, the compressor stops after 10 second no-load operation

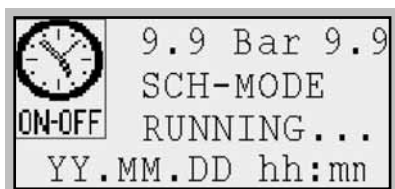
← Stop delay time count



### [Discharge high temp. check alarm display]

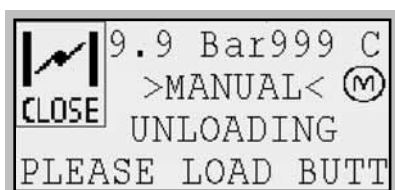
High temperature check alarm is displayed if the discharge temperature is between 95℃ ~110℃

**Notes:** if discharge temperature is higher than 110℃, a trip attributable to excessive temperature occurs and the compressor stops.

**[Schedule operation display]**

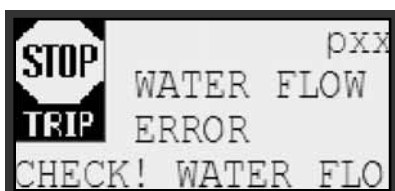
When the compressor operates by schedules or is waiting for the start.

The left figure is displayed when pressing schedule operation button. If pressing START button after selecting schedule operation mode, it operates and stops according to the pre-defined time.

**[Manual no-load operation display]**

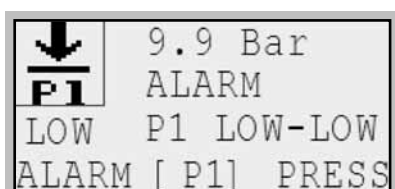
No load operation display when pressing manual no load start button. To return to the load operation, press it again.

← Stop delay time count

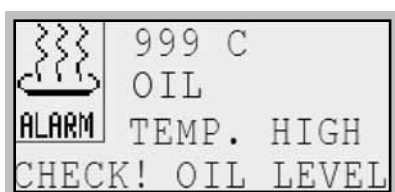
**[Insufficient coolant, trip display] water-cooling type**

When the compressor stops due to insufficient coolant  
A trip occurs when the coolant flow switch operates for 5 seconds after 15 seconds of the operation.

**Notes:** detected only when the main motor is rotating

**[Internal pressure fall, alarm display]**

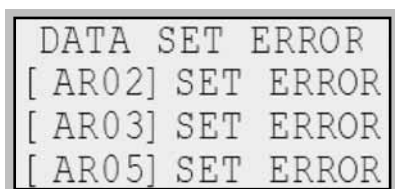
Internal pressure fall alarm display appears when the internal pressure of the compressor during operation falls under 2.0 bar. Since oil lubrication is not sufficient, which may cause troubles in air end and other rotating parts if the internal pressure is lowered, it is necessary to adjust the internal pressure purge valve so that it is maintained over 2.0 bar(internal power detection: 63A).

**[High oil temperature, trip display] Optional**

When the compressor stops due to high oil temperature  
“pxx” troubleshooting page is displayed

Checkpoint: a trip occurs when the oil temperature is higher than 95 °C during operation.

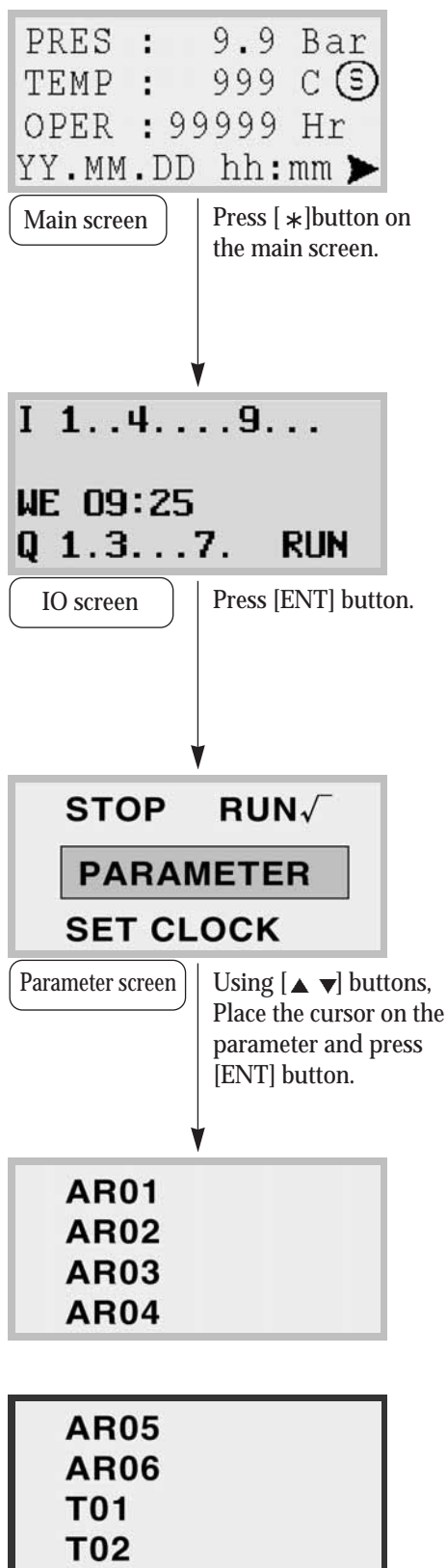
**Checkpoint :** oil level, oil cooler cleaning and etc

**[Data setting error, trip display]**

When the values exceeds the allowable range

If the cursor blinks on a wrongly set item, please re-set the pressure within the allowable range.

## 2. Operation Data Setup



## Operation data setup items

- ❶ AR01: [\*]
- ❷ AR02: Operation diff. pressure
- ❸ AR03: Operation pressure
- ❹ AR04: [\*]
- ❺ AR05: Auto start diff. pressure <sup>1)</sup>
- ❻ AR06: [\*]
- ❼ T01: Y-D switchover time
- ❽ T02: auto stop time
- ❾ T03: [\*]
- ❿ T04: [\*]
- ⓫ T05: [\*]
- ⓬ HW01: input schedule operation time
- ⓭ OT2 : air filter replacement time[\*]
- ⓮ OT3 : oil filter replacement time[\*]
- ⓯ OT4 : separator replacement time[\*]

☞ Every data will be automatically changed for the optimal operation when changing the operation pressure, so no other data but operation pressure does not need changing.

☞ Items with [\*] and some other items are password-protected to prevent any change without permission.

☞ Every operation data are changed in [PARAMETER].

By using [▲ ▼] button, place the cursor on an item to change and then, change the data by pressing [ENT] button. After then, press [ENT] button to complete the input and press [ESC] button. If IO screen is displayed, press [\*] button to move to the main screen.

\* For the details, refer to page 49.

<sup>1)</sup> Auto restart diff. pressure when the compressor automatically stops by no-load operation.

## Auto restart pressure calculation

[AR03] - [AR05] = Auto restart pressure  
7.0 - 1.0 = 6.0 bar



**Operation diff. pressure change**

<b>AR02</b>	<b>MUL</b>
>I1	1.0
>I2	1.0
QV>	100

**Operation pressure change**

<b>AR03</b>	<b>MUL</b>
>I1	7.0
>I2	1.0
QV>	700

**Auto start pressure**

<b>AR05</b>	<b>MUL</b>
>I1	1.0
>I2	1.0
QV>	100

Restart pressure after auto stop by no-load operation

**Schedule operation time**

<b>HW01</b>	<b>A<sub>(A~D)</sub></b>
>DY1	MO
>DY2	SA
ON	08:00
<b>OFF</b>	<b>12:00</b>

<b>HW01</b>	<b>B<sub>(A~D)</sub></b>
>DY1	MO
>DY2	SA
ON	08:00

If placing the cursor on [AR02] and pressing [ENT] button, the left figure is displayed.

Move the cursor on >I1 1.0, press [ENT] button, change the data by using [▲▼] buttons and press [ENT], completing the data change if pressing [ESC]. If pressing [ESC] button, the screen moves to the higher menu.

☞ >I1 10 =1.0 bar

**Caution!** The operation diff. pressure should be set higher than 10(1.0bar). Place the cursor on [AR03] and pressing [ENT] button. Then, the left figure is displayed.

placing the cursor on [AR03] and pressing [ENT] button, then, the left figure is displayed.

Place the cursor on >I1 7.0, press [ENT] button and change the data by using [▲▼] buttons, completing the data change if pressing [ENT]. If pressing [ESC] button, the screen moves to the higher menu.

**Caution!** Do not set it over the rated pressure. It may cause the trouble in the main motor.

Place the cursor on [AR05] and press [ENT] button. Then, the left figure is displayed.

Place the cursor on >I1 1.0, press [ENT] button, change the data by using [▲▼] buttons and press [ENT] button, completing the data change. Then, if pressing [ESC] button, the screen moves to the higher menu.

**Caution!** Set [AR05] I1 higher than 1.0bar. or, the compressor may have a trouble due to frequent starts.

If placing the cursor on [HW01] and pressing [ENT] button, the cursor is moved on [A] in the left screen. If pressing [ENT] button again, the cursor is moved on [MO].

Place the cursor on [MO], press [ENT] button, change the data by using [▲▼] buttons and press [ENT] button, completing the data change.

Place the cursor on [SA], press [ENT] button, change the data by using [▲▼] buttons and press [ENT] button, completing the data change.

[>DY1 MO] From Monday (start operation)

[>DY2 SA ] Until Saturday (end operation)

[ON 08:00] Starts at 08 : 00(start time)

[OFF 12:00] Ends at 12 : 00(end time)

By changing (A-D) in A, operation start/end time can be set in detail.

MO:Monday, TU:Tuesday, WE:Wednesday, TH:Thursday  
FR:Friday, SA:Saturday, SU:Sunday

### Y-D switchover time setting

T01	S .	Second
>I1	05.00	
>I2	00.00	
QV>	00.00	

Place the cursor on [T01] and press [ENT] button. Then, the left screen appears.

Place the cursor on >I1 05, press [ENT] button, change the data by using [▲▼] buttons and press [ENT] button, completing the data change. Then, if pressing [ESC] button, the screen moves to the higher menu.

### Auto stop time setting

T02	M . S	Minute	Second
>I1	10.00		
>I2	00.00		
QV>	00.00		

If placing the cursor on [T02] and pressing [ENT] button, the left screen appears.

Place the cursor on >I1 10, press [ENT] button, change the data by using [▲▼] buttons and press [ENT] button, completing the data change. If pressing [ESC] button, the screen moves to the higher menu.

The compressor stops if it operates under no load longer than the pre-defined time.

**Caution!** Do not set T02 shorter than 5 mins. Frequent starts may cause the trouble in the main motor.

### 3. Micom time setting

When the compressor is released, the time is set on Micom, based on the standard time of the Republic of Korea. Since schedule operation starts in the pre-defined time, make sure to set the time accurately. A user does not have to re-set the time except a special case and if the time should be inevitably re-set, set the time according to the following steps.

#### SET CLOCK

SET CLOCK DST
------------------

- ① Place the cursor on [PARAMETER] and press [ENT] button.
- ② Place the cursor on SET CLOCK and press [ENT] button.
- ③ Place the cursor on an item to change by using [▲▼], [◀▶] buttons and press [ENT] button to change time, date and year.

#### Time, date, year

HH:MM 80:00
DD:MM 07:12
YEAR 2007



HH:MM 80:00	← HH: hour MM: minute
DD:MM 07:12	← DD: date MM: month
YEAR 2007	← YEAR: year

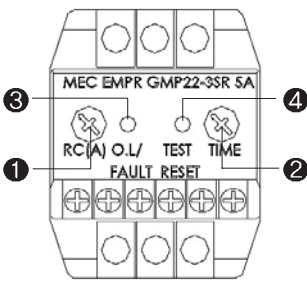
## 6. Troubleshooting

### 6-1 Protective Devices and LCD Message List

#### 1. Protective Devices

The following protective devices are contained to protect the compressor against dangerous situation and the measures should be taken by referring the functions.

63A (pressure switch for internal pressure detection)		49M1 (Fan motor overload relay)	
	<p><b>Operation</b></p> <p>It detects internal pressure and disables the operation in case of 2.0 and lower pressure</p> <p><b>Contact point(A/B)</b></p> <p>On : 2.0 bar and higher</p> <p>Off : 2.0 bar and lower</p>		<p><b>Operation</b></p> <p>If excessive current is allowed, the compressor stops due to fan motor overload.</p> <p><b>Contact point</b></p> <p>Normal : 97-98 off</p> <p>Overload : 97-98 on</p>

49M2 (main motor overload relay)																																	
	<p><b>① RC(A) knob</b></p> <p>- Set the operating current</p> <p><b>② Time knob</b></p> <p>- Set the operating time</p> <p><b>③ O.L./Fault LED</b></p> <p>- LED working according to each different condition</p> <p><b>④ Test/Reset</b></p> <p>- Check the normal working condition of button output contacts</p>	<table><tr><th colspan="2">Condition</th><th colspan="2">LED working condition</th></tr><tr><td rowspan="4">During operation</td><td>Normal operation</td><td colspan="2">Light out</td></tr><tr><td>Over current before shutdown</td><td colspan="2">Red light flickering every 0.4 second</td></tr><tr><td>Phase unbalance (30~50%)</td><td colspan="2">Green light flickering every 0.4 second</td></tr><tr><td>Over current after shutdown</td><td colspan="2">Red light on</td></tr><tr><td rowspan="5">When trip</td><td rowspan="3">Open phase (3CT)</td><td>R</td><td>Green light flickering one time every 3 seconds with red light on</td></tr><tr><td>S</td><td>Green light flickering two times every 3 seconds with red light on</td></tr><tr><td>T</td><td>Green light flickering three times every 3 seconds with red light on</td></tr><tr><td>Open phase (2CT)</td><td colspan="2">Red light on for 0.9 second / Red light out only for 0.1 second</td></tr><tr><td>Reverse phase (3CT)</td><td colspan="2">Red light and green light flickering by turns</td></tr></table>	Condition		LED working condition		During operation	Normal operation	Light out		Over current before shutdown	Red light flickering every 0.4 second		Phase unbalance (30~50%)	Green light flickering every 0.4 second		Over current after shutdown	Red light on		When trip	Open phase (3CT)	R	Green light flickering one time every 3 seconds with red light on	S	Green light flickering two times every 3 seconds with red light on	T	Green light flickering three times every 3 seconds with red light on	Open phase (2CT)	Red light on for 0.9 second / Red light out only for 0.1 second		Reverse phase (3CT)	Red light and green light flickering by turns	
Condition		LED working condition																															
During operation	Normal operation	Light out																															
	Over current before shutdown	Red light flickering every 0.4 second																															
	Phase unbalance (30~50%)	Green light flickering every 0.4 second																															
	Over current after shutdown	Red light on																															
When trip	Open phase (3CT)	R	Green light flickering one time every 3 seconds with red light on																														
		S	Green light flickering two times every 3 seconds with red light on																														
		T	Green light flickering three times every 3 seconds with red light on																														
	Open phase (2CT)	Red light on for 0.9 second / Red light out only for 0.1 second																															
	Reverse phase (3CT)	Red light and green light flickering by turns																															

#### 2. Trip, Alarm LCD Messages

##### Alarm display [compressor operation]

If the following messages are displayed, immediately replace the filters and check them.

NO	Micom LCD Display	Detection	Measure	Measure
1	AIR F. CHANGE	Use time	Reset the time after replacing air filter	
2	OIL F. CHANGE	Use time	Reset the time after replacing oil filter	
3	SEPARATOR CHANGE	Use time	Reset the timer after replacing separator	
4	DISCHARGE TEMP. HIGH	Temp. sensor	Check oil level and clean up the cooler	95~109 ℃
5	P1 LOW-LOW	63A	Adjust internal pressure adjustment valve	

##### Trip display [compressor stop]

If the following messages are displayed, check the accurate trip location, take a measure and restart the compressor.

NO	Micom LCD Display	Detection	Measure	Remarks
1	FAN MOTOR OVERLOAD	49M1	Check fan motor and electric wiring	
2	MAIN MOTOR OVERLOAD	49M2	Check 49M2 and main motor	EMPR
3	ANSWER SIGNAL OFF	52 / 42	Check operation signal	Magnet
4	DISCHARGE TEMP 110 OVER	Temp. sensor	Check oil level and clean up the cooler	
5	T-SENSOR TROUBLE	Temp. Sensor	Check temp. sensor and wiring	
6	P-SENSOR TROUBLE	Pressure sensor	Check pressure sensor and wiring	
7	REVERSE PHASE	49M3	Lead-in power reverse phase	EMPR
8	WATER FLOW ERROR	WFS	Coolant level and pro switch	

### 6-2 Trouble Causes and Measures

#### 1. Fan motor overload, trip

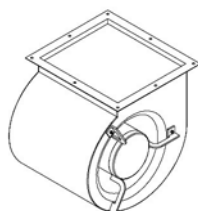


Causes: fan motor overload or wrong connection of fan motor power cable

Checkpoint: check the current and electric wiring

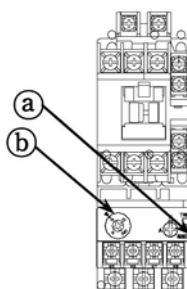
If overload is found as a result of measuring the current, check it as follows.

How to reset: press (a) and then press [STOP] button on Micom.



##### Motor overcurrent

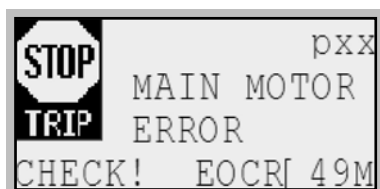
- Check the fan rotation by rotating it with hands
- Check the R/S/T phases of the power cable.



##### If the current is normal, check the electric wiring

- If 97-98 is off after the power-off, the status is normal
- Check the current value setting (b) to see whether the motor is set by the rated current.

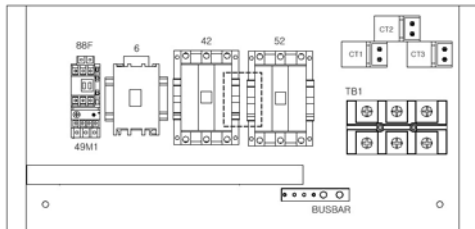
#### 2. Main motor overload, trip



Causes: main motor overload, 52 & 42 magnet contact point damage, voltage drop

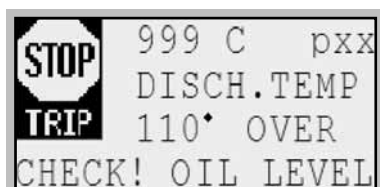
Checkpoint: Check the main motor rotation by rotating the air end with hands.

How to reset: Press [STOP] button of Micom after taking a corrective measure.



- With 49M2(EOCR), check whether the trip lamp is on. In case it's on, it means overload, checking the main motor and supply voltage.
- Check the power cable connection of 42&52 and the magnet's contact point.

#### 3. High discharge air temperature, trip

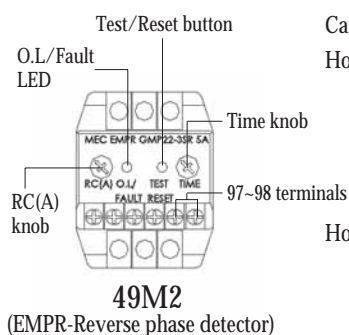


Causes: high discharge air temperature

Checkpoint: refer to page 52 for compressor inhalation(ambient) temperature, oil level, oil cooler and cleaning oil cooler.

How to reset: Take a corrective measure and press [STOP] button of Micom.

#### 4. Lead-in power reverse phase, trip(option)



Cause : Input power reverse phase detected or 49M2 troubled

How to check : Please replace the input cable if the red lamp and green lamp of 49M2 flicker by turns. Please refer to page 36 when replacing. If no. 97 terminal and no. 98 terminal were contacted when the power is out, 49M2 is bad.

How to reset : Make it corrected and push the [STOP] button of Micom

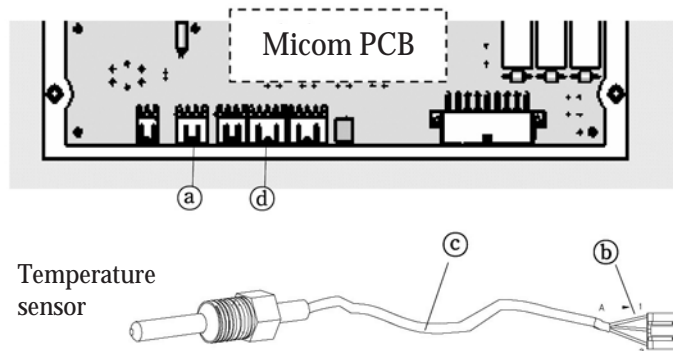
## 5. Abnormal temp. sensor , trip



Causes: temperature sensor fault

Checkpoint: Check sensor cable connection, sensor cable disconnection and sensor. Take a measure by referring to the following figure.

How to reset: After taking a measure, press [STOP] button of Micom.



- ❶ Check whether the connector is correctly inserted to ①
- ❷ Check any disconnection of sensor cable in ②
- ❸ Check any disconnection of sensor cable in ③

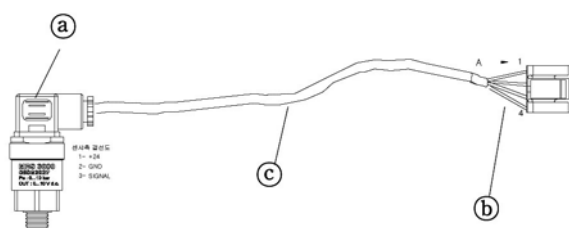
## 6. Pressure sensor fault, trip



Causes: pressure sensor fault

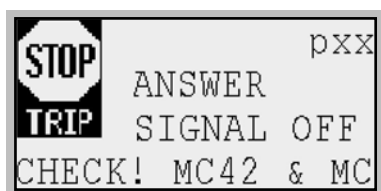
Checkpoint: Check sensor cable connection, sensor cable disconnection and sensor. Take a measure by referring to the following figure.

How to reset: After taking a measure, press [STOP] button of Micom.



- ❶ Check whether the connector is correctly inserted in ①
- ❷ Check whether the sensor cable is disconnected in ②
- ❸ Check whether the signal cables in ③ and ④ are connected

## 7. Abnormal ANSWER, trip

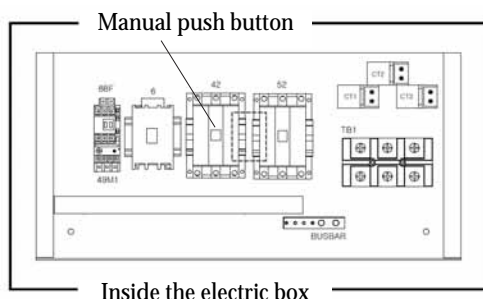


Causes: abnormal auxiliary contact point(13-14) of 42/52 magnet

Checkpoint: check the 42/52 magnet auxiliary contact point inside the electrical box.

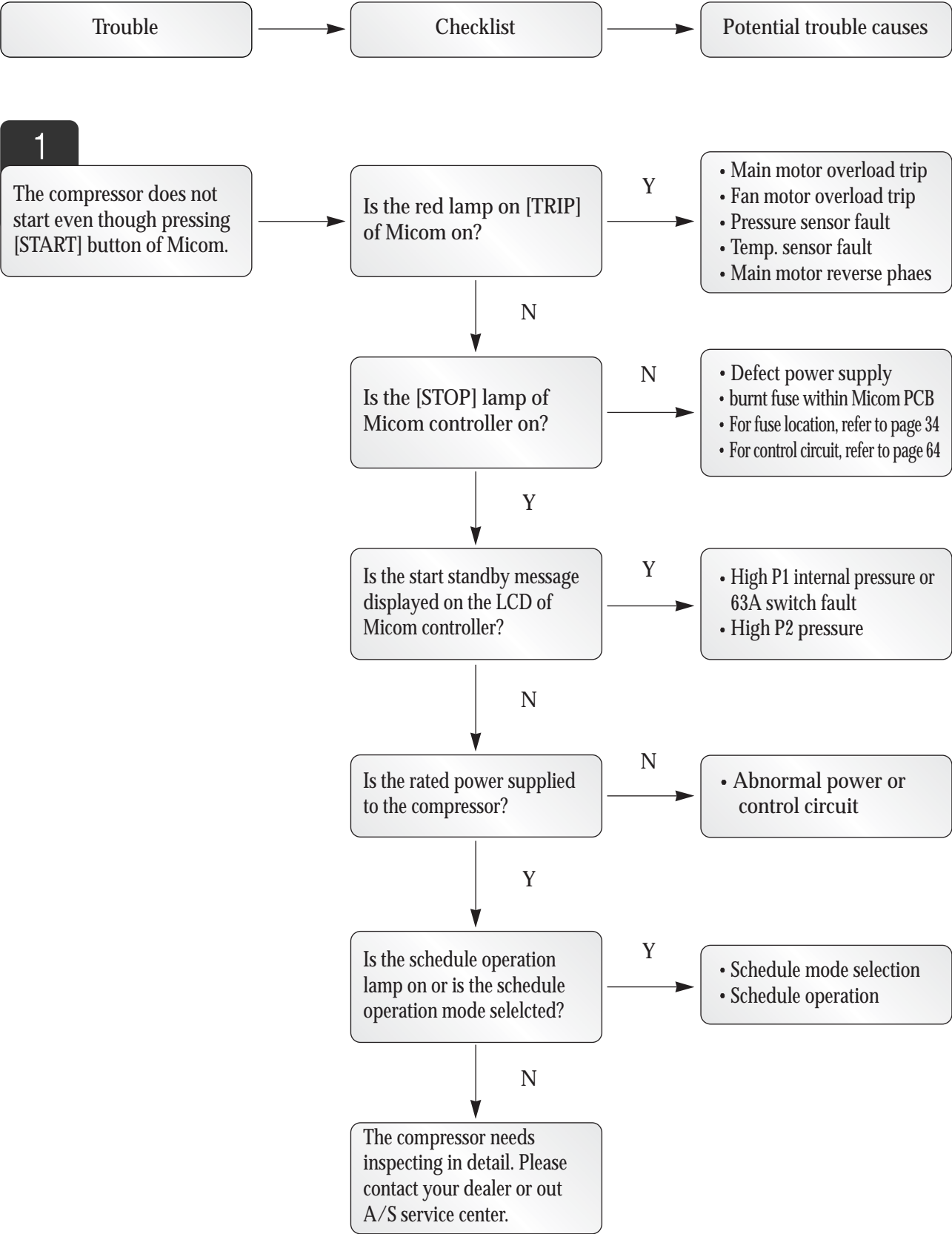
The compressor can work normally as long as 42(13-14)/52(43-44) terminal is on.

How to reset: press [STOP] button of Micom.

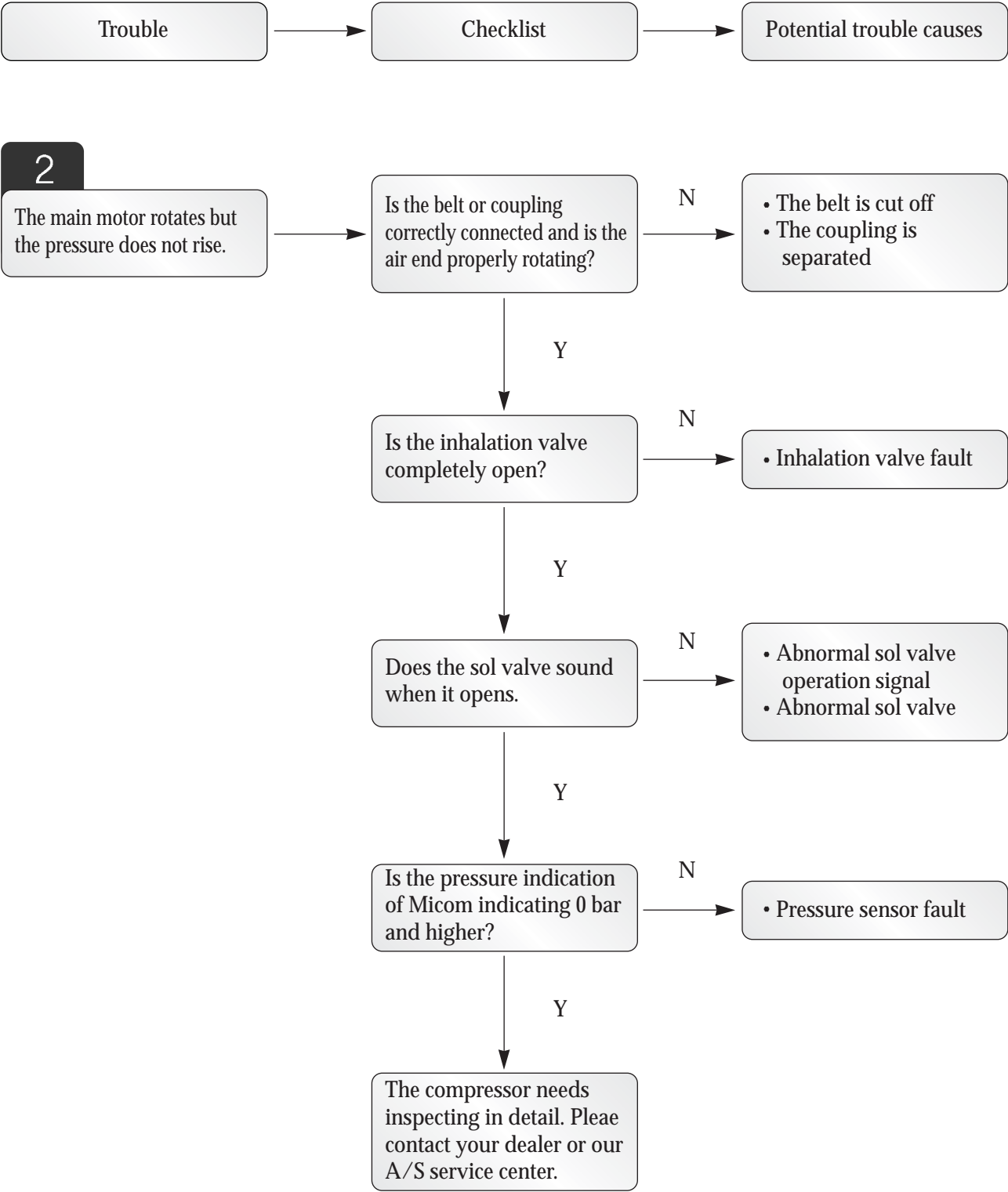


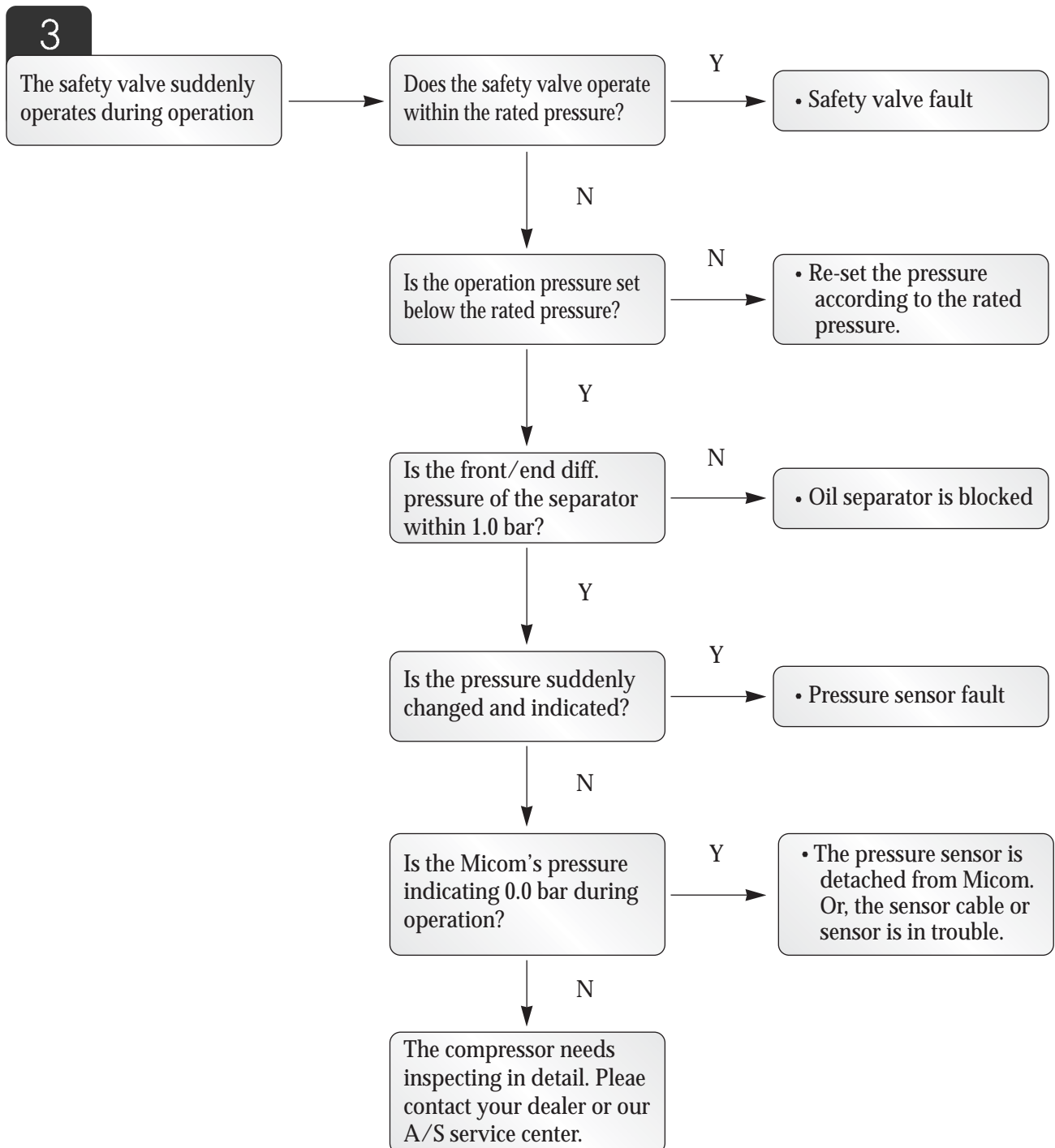
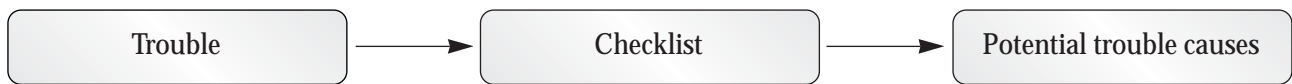
Check the auxiliary contact point of 42/52 magnet with a tester. Press the push button on the center of the magnet. Then, when pressing the push button, 13-14 to 42 and 43-44 of 52 should allow the electricity.

8. Troubleshooting flowchart











## 7. Maintenance

### ■ 7-1 Regular Maintenance



Caution

- Before maintenance and check, read [About Safety] carefully.
- Every time you maintain the compressor, make sure to turn off the power. Or, it may cause unexpected accidents such as electric shock.
- When coupling or disassembling parts, discharge the internal pressure to the air. In case detaching bolts and pipes, it may cause a trouble due to internally remaining pressure.

#### 1. Routine operation control

Please record the daily operation details in the compressor operation log. Maintain the compressor if any values higher than the settings are found.

#### 2 . Regular maintenance

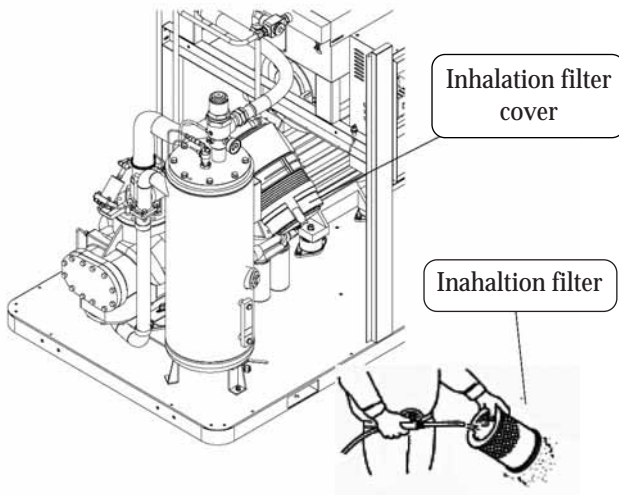
- 1) For the maintenance criteria, refer to the maintenance list.  
Depending on the environment situation of installation place, the compressor may be necessarily maintained earlier than the standard maintenance.
- 2) If any abnormal parts are found during the maintenance, promptly replace them.
- 3) Make sure to replace them with the company's genuine parts.

#### 3. Motor protection and maintenance

- 1) Temperature rise  
The temperature rise limit of the motor coil is 125°...(based on 40°... ambient temperature). If the motor overheats even under normal load operation, check the motor immediately(refer to the motor's specifications).
- 2) Cleaning and insulation resistance check  
Frequently clean it up to prevent dust or impurities from inserting to the motor.  
By measuring the motor winding with 500V insulation resistance tester during regular check, check whether it indicates 10 and higher, which is the normal status).
- 3) Greasing the motor  
For the motor grease level and the interval, refer to the motor specifications.

### 7-2 Maintenance Methods

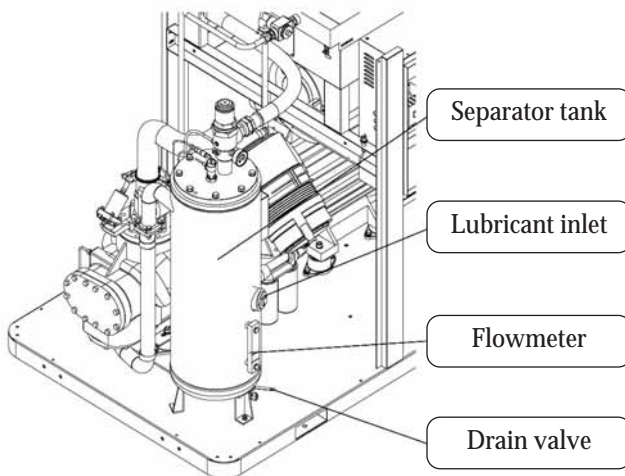
#### 1. Replacement and cleaning of inhalation filter /



The inhalation filter diff. pressure during operation is 4.98kpa [508mmH<sub>2</sub>O]. The inhalation filter should be maintained according to the standard maintenance criteria.

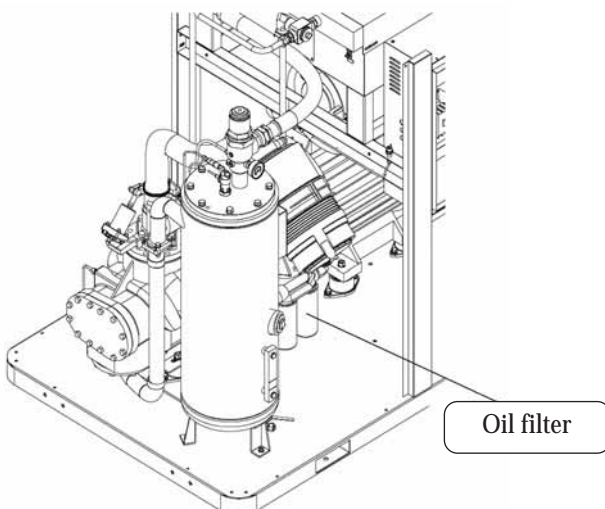
- ① Open the front left of the sound proof cover.
  - ② Open the inhalation filter cover and detach the filter.
  - ③ After detaching the filter, a special attention should be paid to avoid any impurities or dust from inserting into the inhalation valve.
  - ④ Clean the compressor air to clean up the inhalation filter.
- If it is time to replace the filter, immediately replace the filter.

#### 2. Lubricant replacement / 3000hr



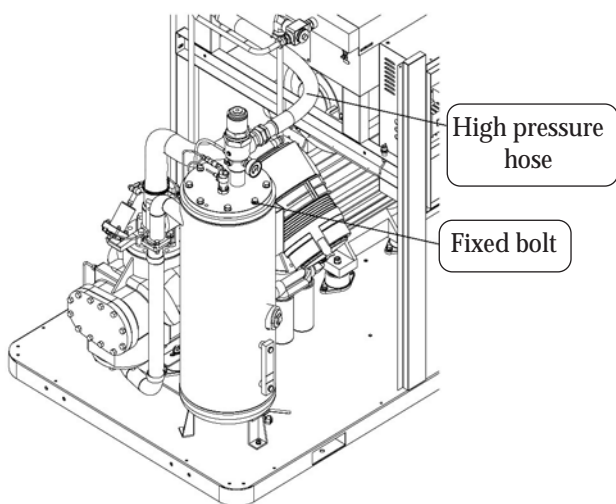
- ① Open the front left of the sound proof cover.
- ② Open the drain valve located at the bottom of the separator tank, discharge the used lubricant and then, close it again.
- ③ Open the lubricant inlet and replenish lubricant. Keep inserting it until it indicates the upper limit.
- ④ If lubricant is completely replenished, operate the compressor, stop it, check the flowmeter and replenish it more if the level is not sufficient.

#### 3. Oil filter replacement / 3000hr



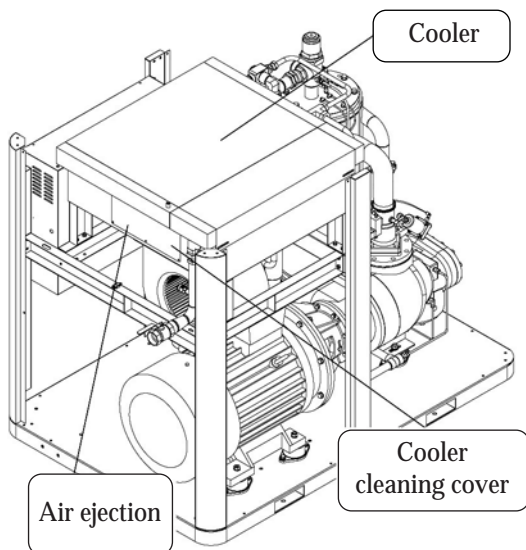
- ① Open the front left of the sound proof cover.
- ② Loosen the oil filter by using chain wrench or other tools.
- ③ To couple the oil filter, apply small quantity of oil on O-ring by hands and smoothly tighten it by using wrench or other tools.
- ④ Visually check whether it has any oil leakage while operating the compressor.

#### 4. Replacement of oil separator / 3000hr



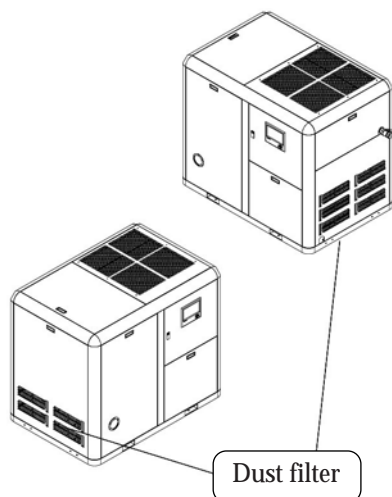
- ① Open the front left of the sound proof cover.
- ② Loosen the upper bolt of separator tank by using spanner and other tools.
- ③ Loosen the high pressure hose.
- ④ Replace the separator and gasket.
- ⑤ Visually check whether the compressor has any oil leakage during operation after replacement.

#### 5. Cleaning cooler



- ① Detach the rear ·left ·right sound proof cover.
- ② Loosen the cooler cleaning bolt.
- ③ Remove dust while ejecting the compressor air toward the cooler.

#### 6. Cleaning dust filter



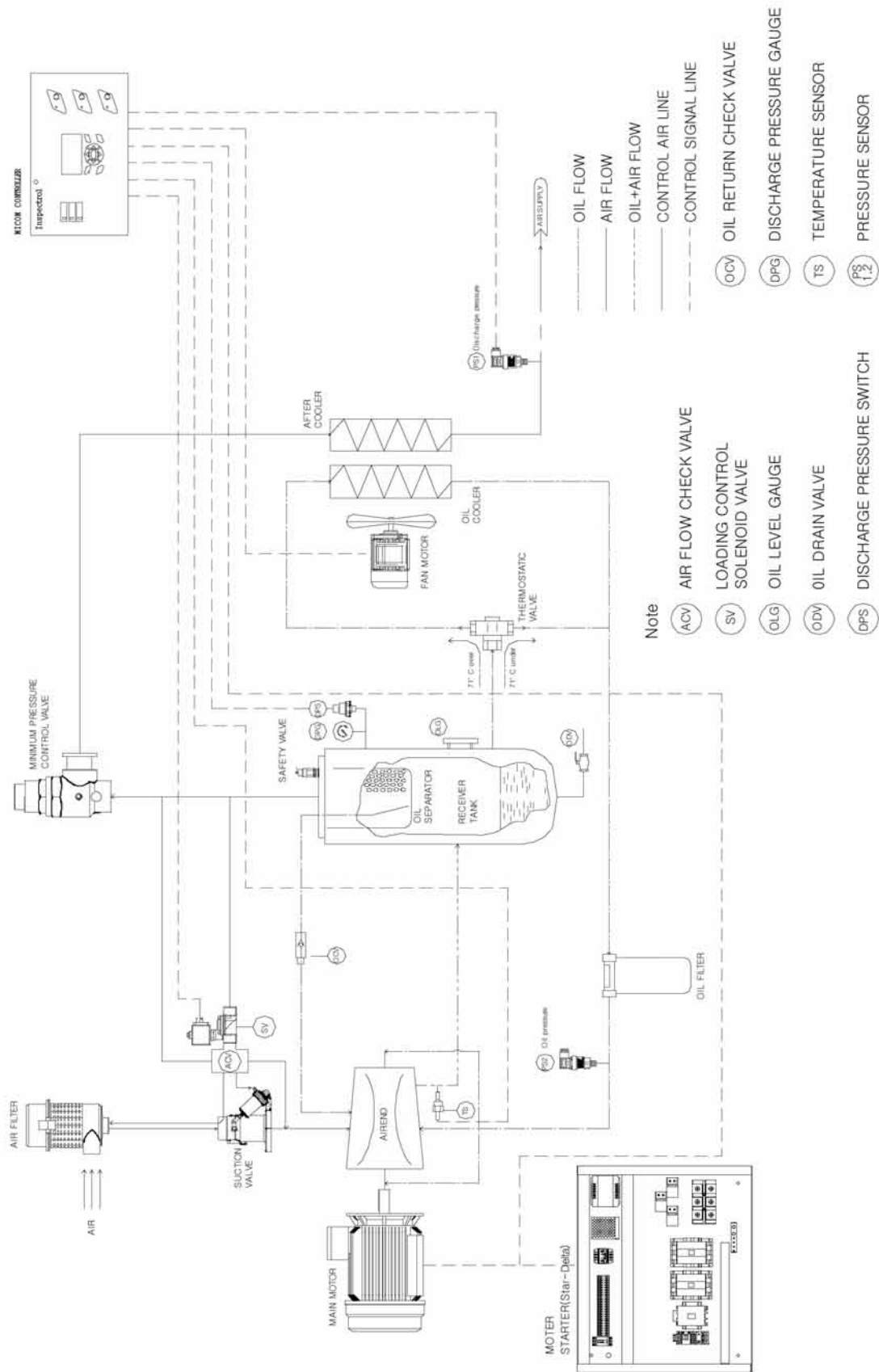
There are two dust filters on the front right of the compressor.  
Periodically check it and clean up as follows.

- ① Clean it up with air.
- ② Or, use the compressor air to clean it up.



# 8. Control System

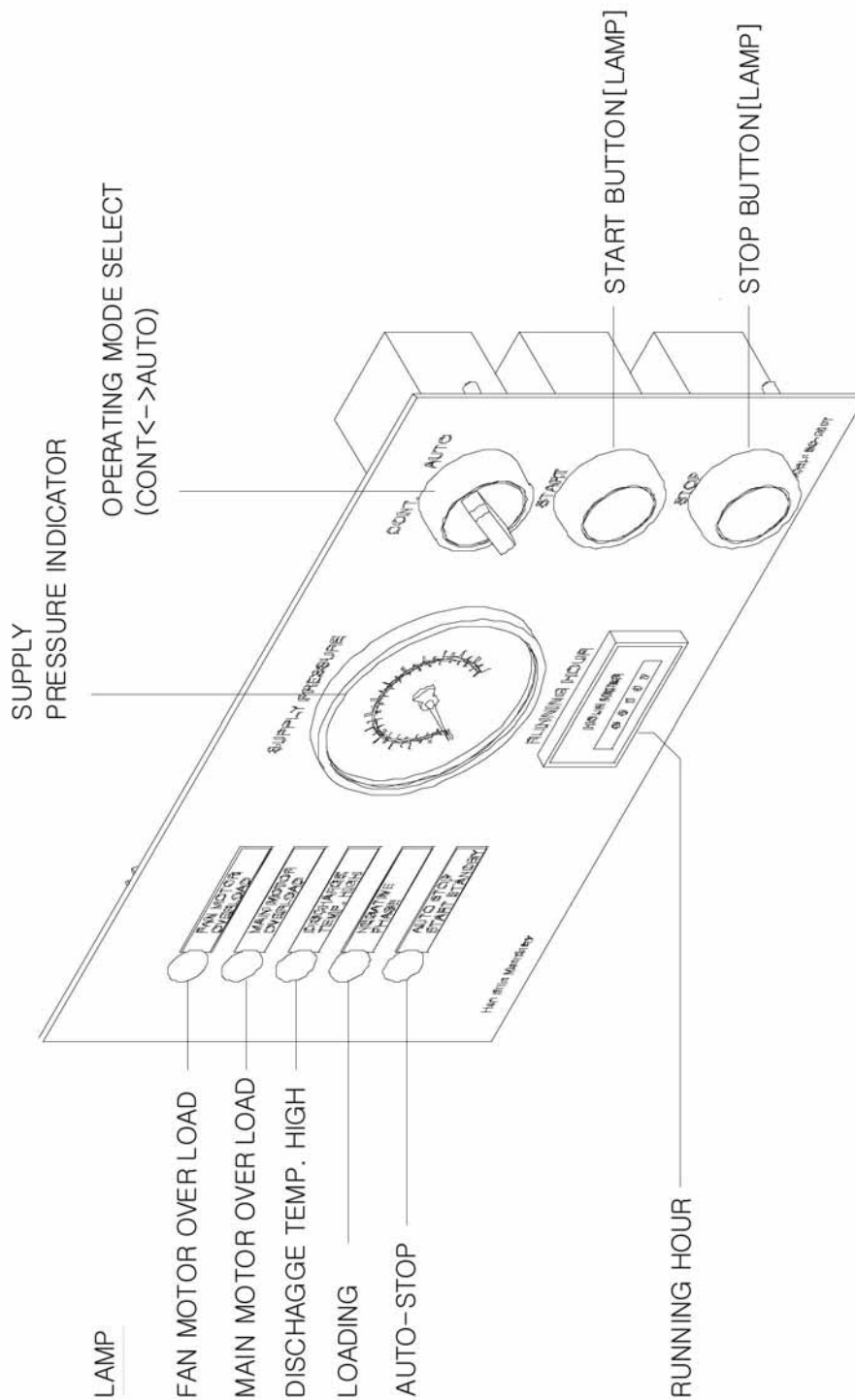
## 8-1 Compressor Configuration Layout



■ 8-2 Control circuit

1. Analogue Controller (ACP-2007) GRH3-20A~35A

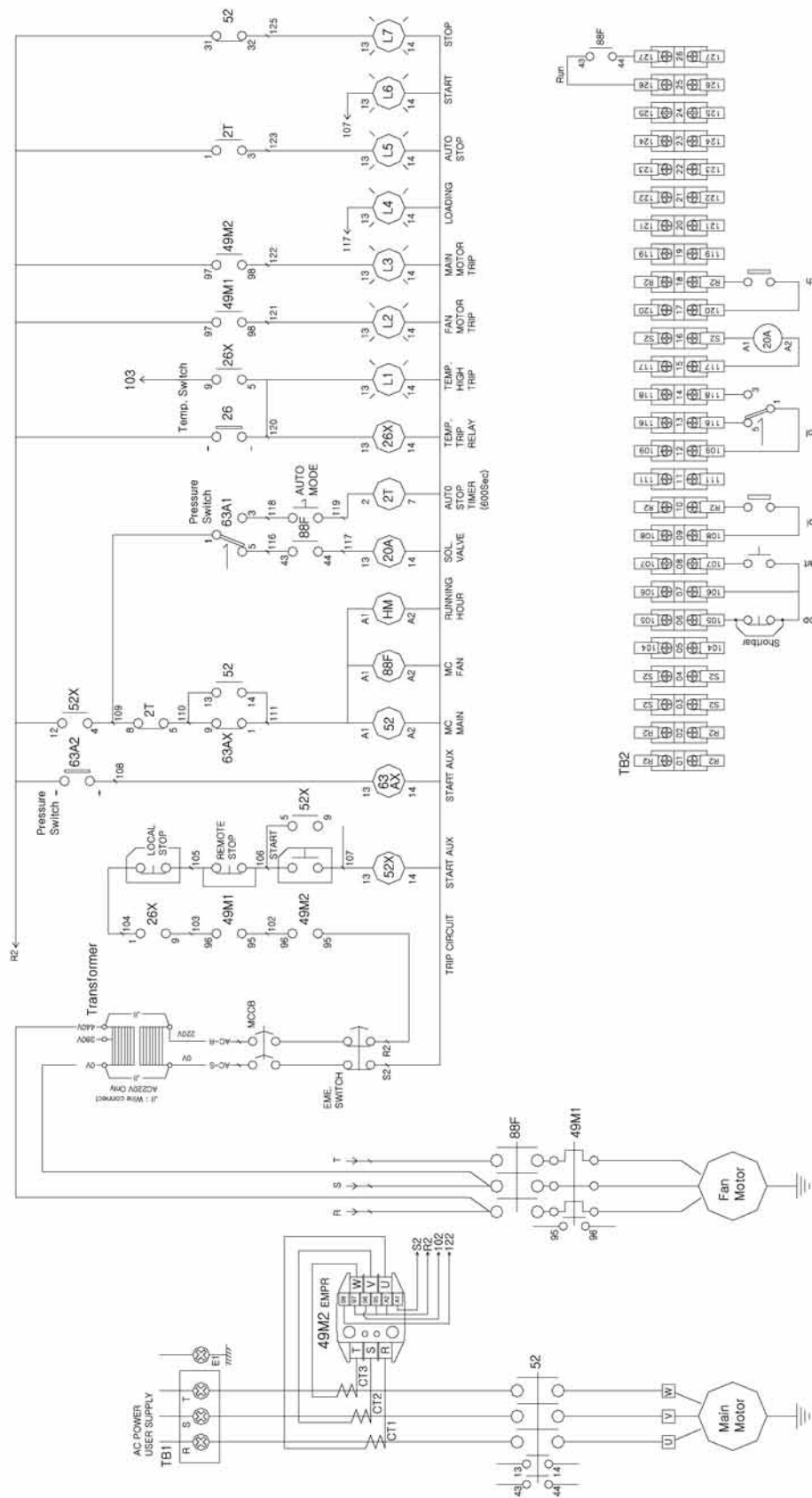
CONTROL PANAL



**Caution!**

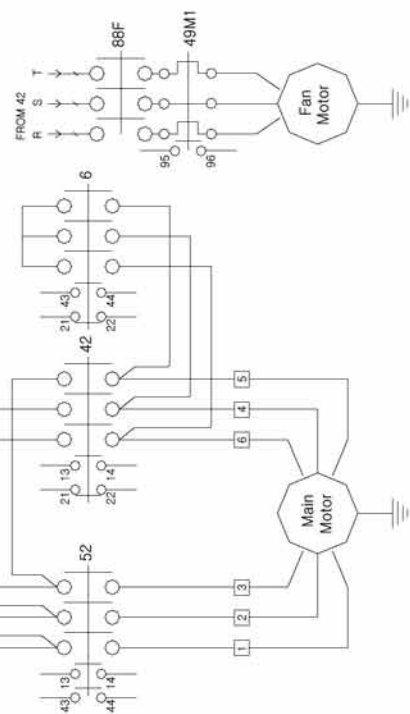
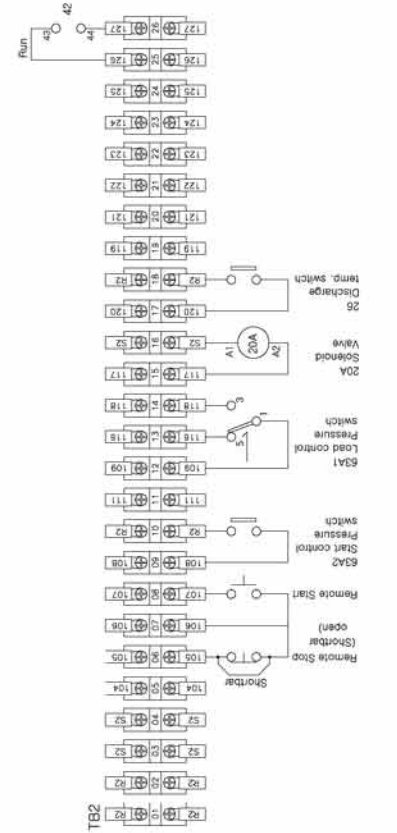
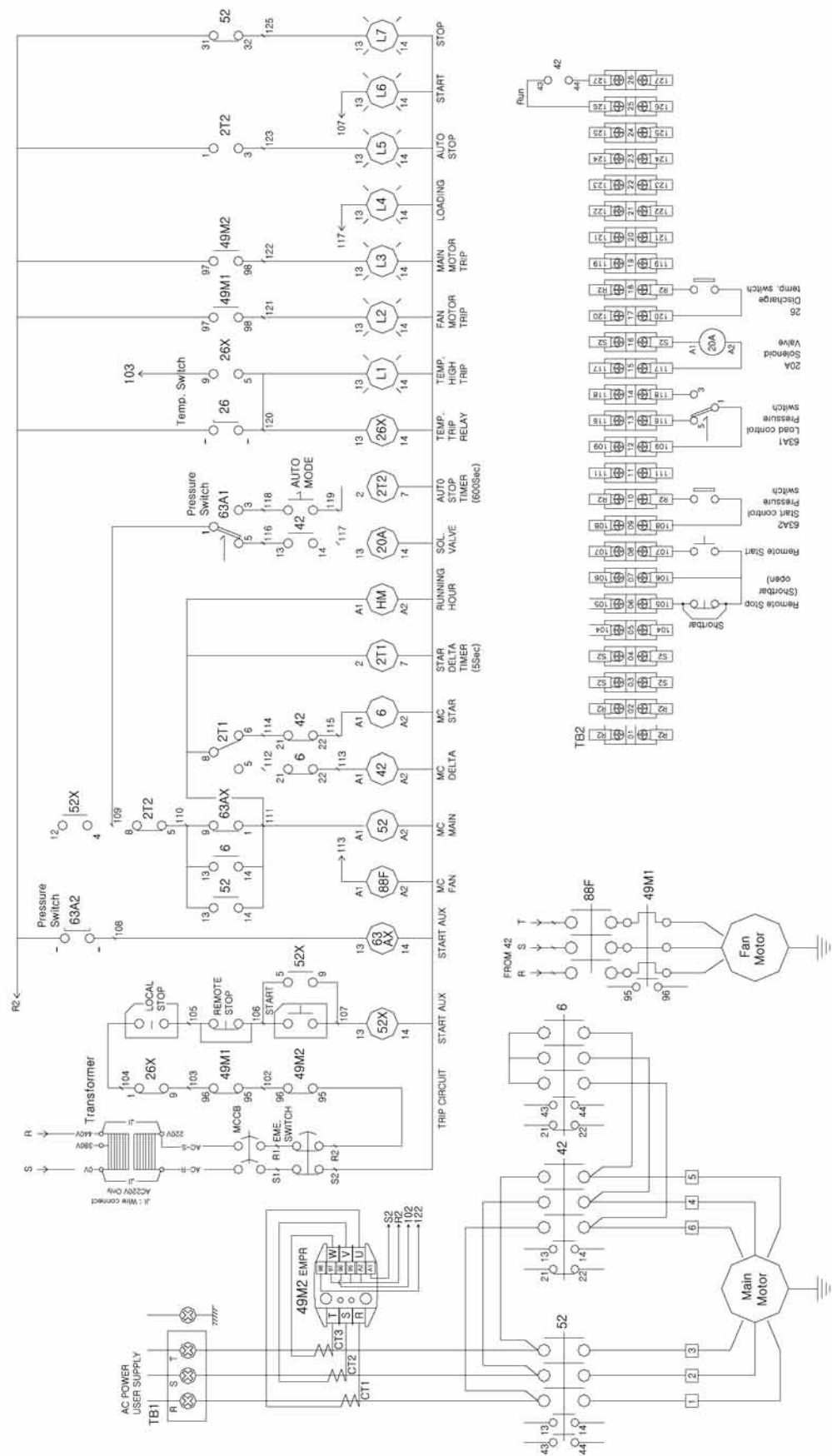
If [START] and [STOP] lamps are simultaneously on, it means that the compressor stops due to the internal pressure rise. When you repair or maintain the compressor, please note that the compressor automatically restarts if the pressure falls fewer than 2.0 bar.

2. Micom Controller GRH3-50A~100A

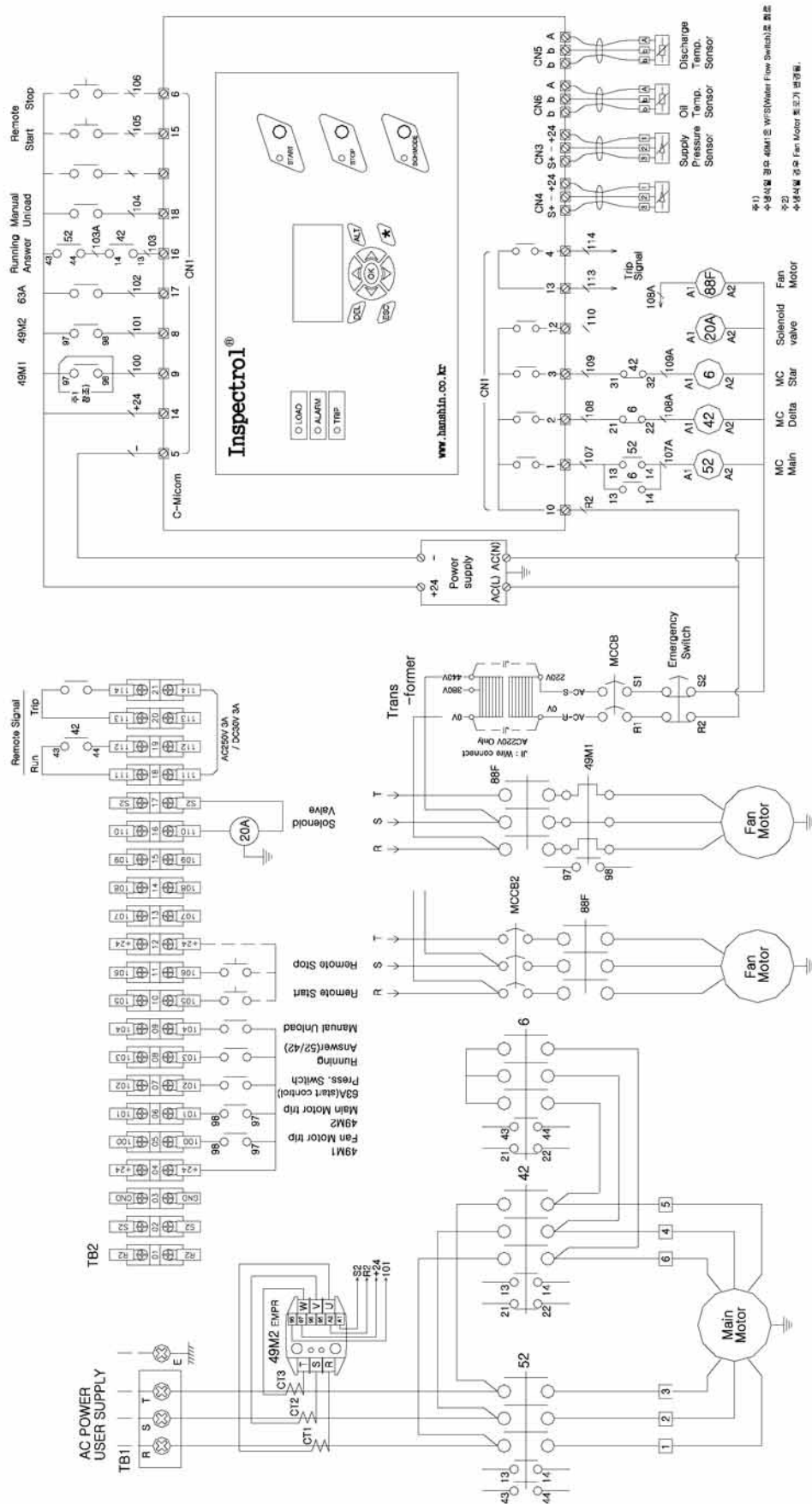




3. GRH3-25A, 30A, 35A, 50A Star-delta 기동 회로



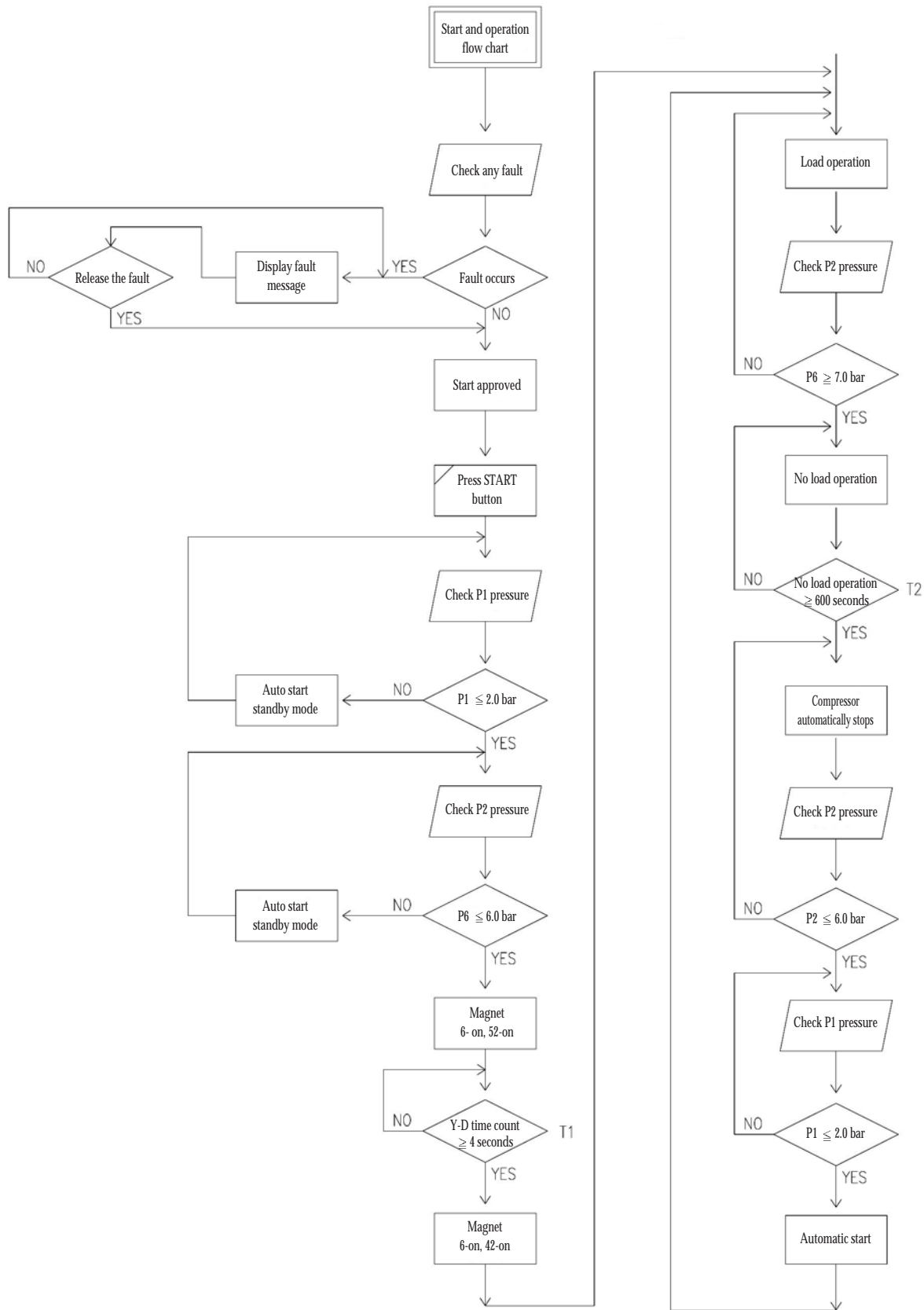
## 4. GRH3-75A, 100A Star-delta 기동 회로



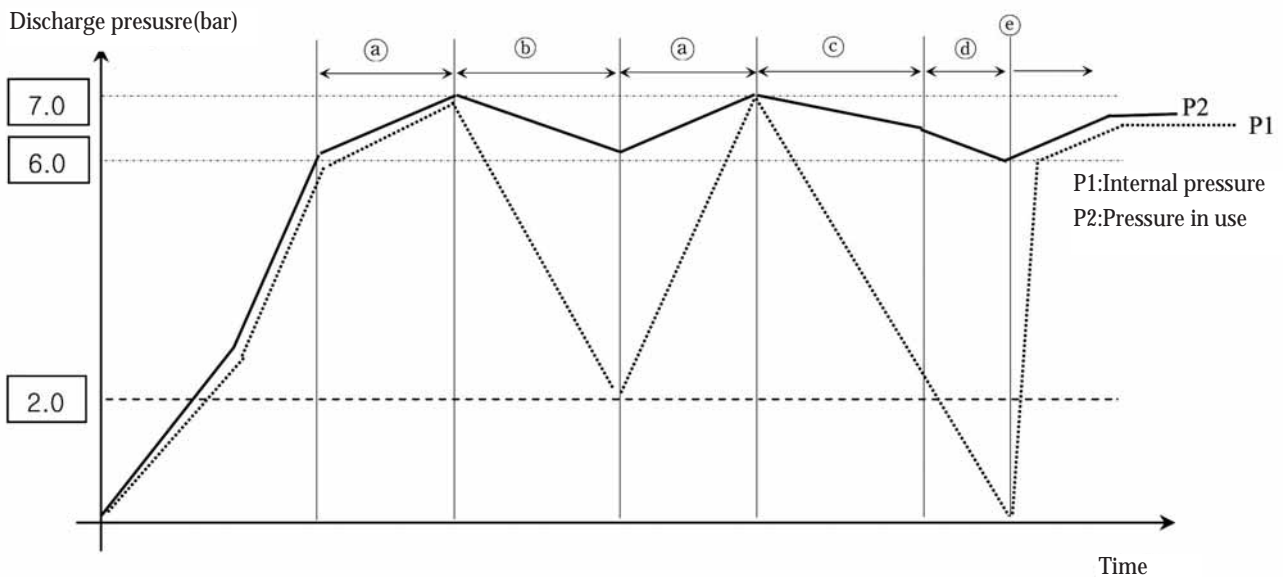


8-3 Operation flow chart

1. Control flow chart



## 2. Pressure Control Graph(Operation setting pressure: 7.0bar)



- ① Section: compressor load operation section  
If P2 pressure is lower than the no-load start pressure after the compressor starts, it starts load operation.
- ② ③ Sections: compressor no-load operation section  
If P2 pressure is higher than the no-load start pressure, it operates under no load up to 6.0bar; if lower than 6.0 bar, it returns to load operation.
- ④ Section: auto stop section  
If no-load operation lasts over 10 minutes in ③ section, the compressor automatically stops; if P2 pressure falls under 6.0 bar, the compressor automatically starts.
- ⑤ ③ and ④: internal pressure purge section  
The internal pressure(P1) during no-load operation falls up to 2.0 bar; if it automatically stops, the internal pressure falls up to 0 bar.
- ⑥ Position: automatic restart  
If P2 pressure falls lower than 6.0 bar after auto stop, the compressor automatically starts.

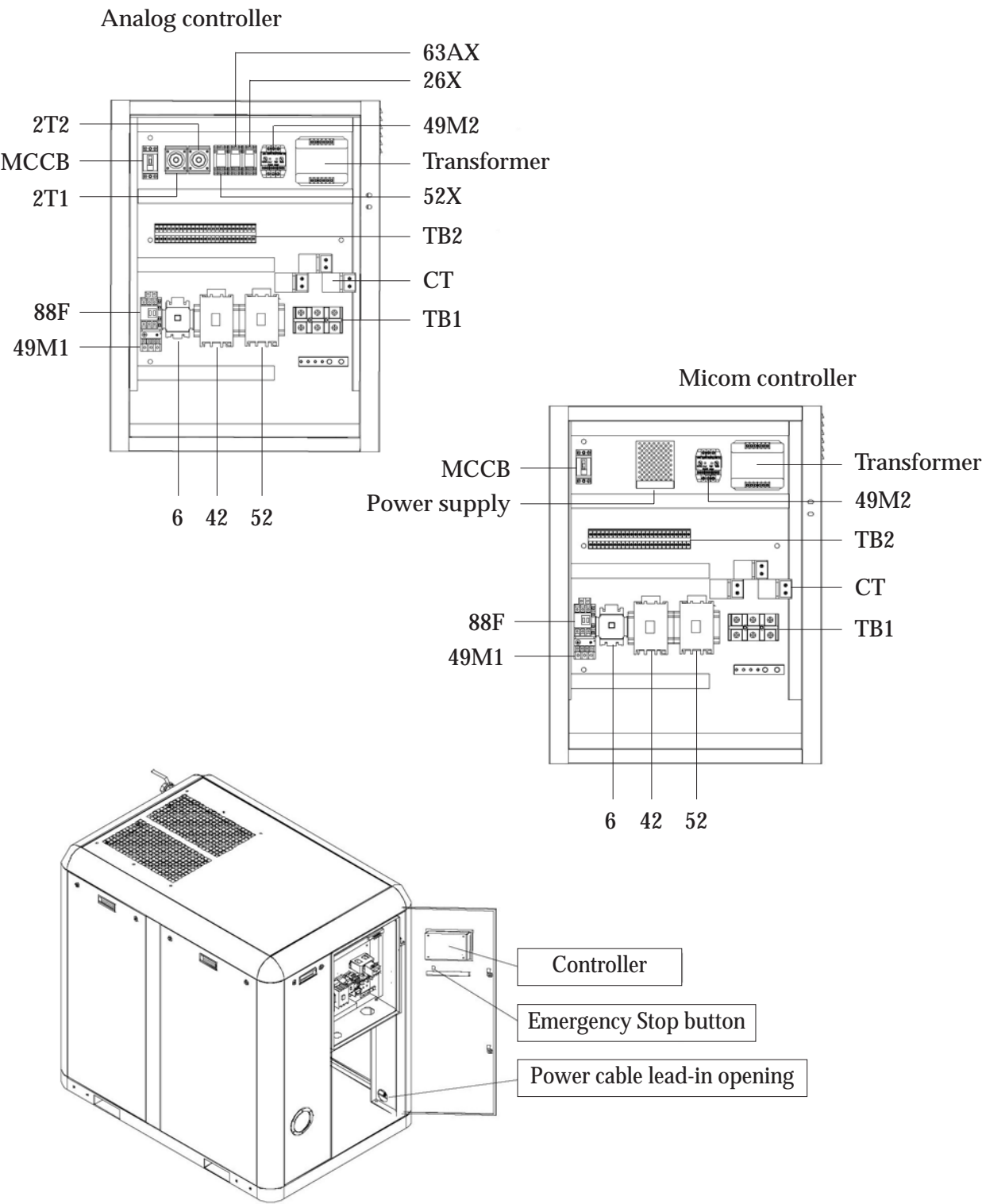
## Pressure variation of each part during the operation and at the auto stop

&lt;Pressure spec.:7bar&gt;

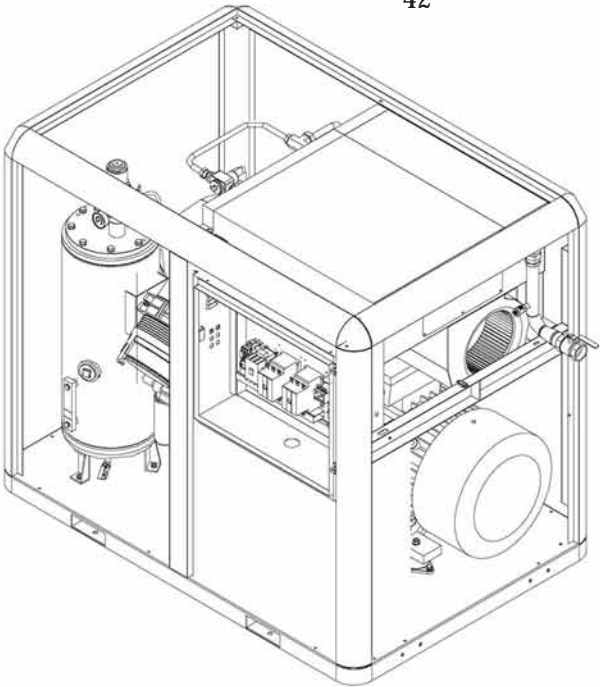
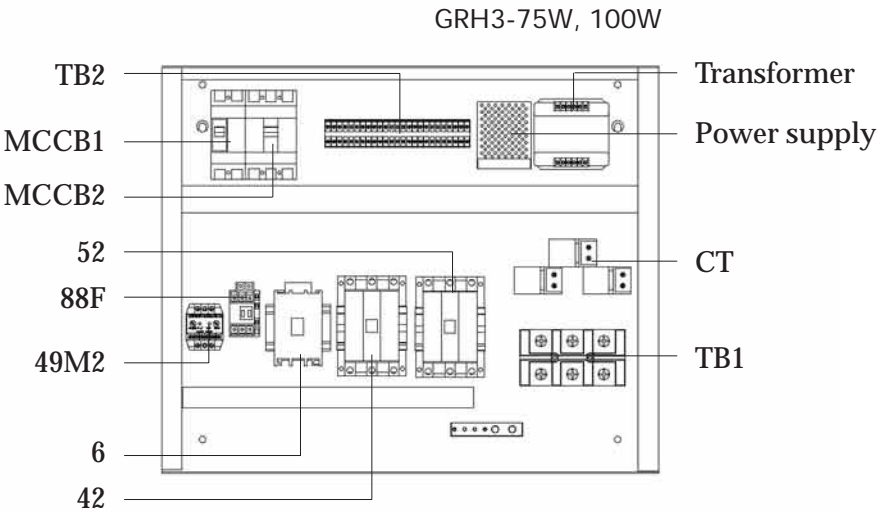
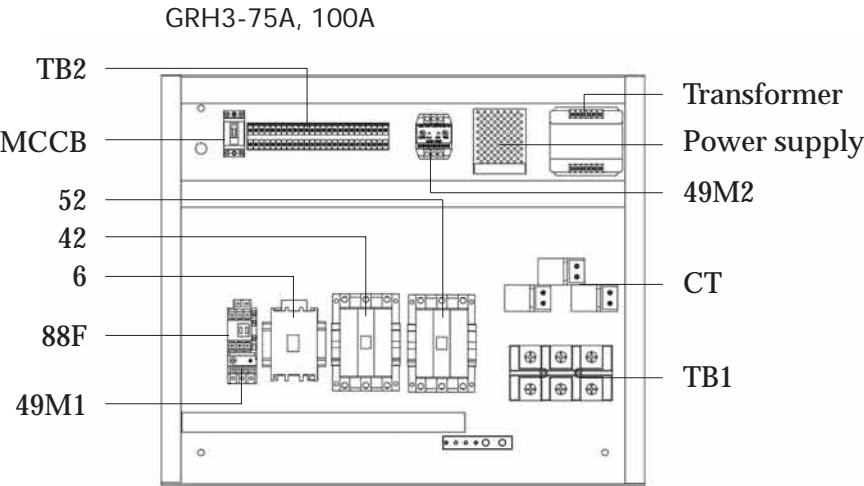
Status	Operation condition	P1	P2
Operation	Load operation	Normal if pressure variation is within 1bar	
	No Load operation	≒ 2.0 bar	6~7 bar
condition	Auto stop	0 bar	6~7 bar

■ 8-4 Arrangement Diagram and Spec. of Control Parts

1. Inside View of Electrical Box GRH3-20A, 25A, 30A, 35A, 50A



2. Inside View of Electrical Box(Micom Controller) GRH3-75A,100A



## 2. Spec. of Major control parts

## Spec. of AC220V / 60Hz control parts

Item			Input voltage: AC220V				
Mark	Name	Manufacturer	GRH3-20A	GRH-3 25A, 30A, 35A	GRH3-50A	GRH3-75A	GRH3-100A
MCCB	Cable-wiring circuit-breaker	LS IS	BS32a-6A				
TB1	Terminal block	Geonheung	KH6060-3	KH60100-3	KH60150-3	KH60200-3	KH60300-3
TB2	Terminal block	Jeono	JOTN-15A				
POWER SUPPLY	DC power supply	Suntronics	-			VSF30-24	
52/42	Main magnet	LS IS	GMC-65		GMC-100	GMC-150	GMC-180
6	Dynamic magnet	LS IS	-	GMC-40	GMC-65	GMC-85	GMC-100
88F	Fan magnet	LS IS	GMC-9			GMC-12	
49M1	Overload relay	LS IS	GTH22-5(3.3)		GTH22-6.5(5)	GTH22-11(8.5)	
49M2	Overload relay	Samhwa	EOCR-SS05				
63A1	Pressure switch	-	CNS-C110		DP-07		
63A2	Pressure switch	-	DP-07				
P-SENSOR	Pressure switch	DANFOSS	-		MBS3000		
T-SENSOR	Temperature switch		THERMO SWITCH		Pt100 Ohm		

## Spec. of AC380V(440V) / 60Hz control parts

Item			Input voltage: AC380V (440V)				
Mark	Name	Manufacturer	GRH3-20A	GRH-3 25A, 30A, 35A	GRH3-50A	GRH3-75A	GRH3-100A
MCCB	Cable-wiring circuit-breaker	LS IS	BS32a-6A				
TB1	Terminal block	Geonheung	KH6060-3	KH6060-3	KH60100-3	KH60150-3	KH60200-3
TB2	Terminal block	Jeono	JOTN-15A				
POWER SUPPLY	DC power supply	Suntronics	-		VSF30-24		
52/42	Main magnet	LS IS	GMC-40		GMC-65	GMC-85	GMC-100
6	Dynamic magnet	LS IS	-	GMC-32	GMC-40	GMC-50	GMC-65
88F	Fan magnet	LS IS	GMC-9			GMC-12	
49M1	Overload relay	LS IS	GTH22-3.3(2.1)		GTH22-3.3(3.3)	GTH22-6.5(6.5)	
49M2	Overload relay	Samhwa	EOCR-SS05				
63A1	Pressure switch	-	CNS-C110		DP-07		
63A2	Pressure switch	-			-		
P-SENSOR	Pressure switch	DANFOSS	-		MBS3000		
T-SENSOR	Temperature switch	-	KH100-ON		Pt100 Ohm		
TRANS	Trans	Unyeong	WY42-150AW		WY 42-200AW		

NOTE&gt; ( ):50Hz

# 9. Specifications

Model			GRH3 20A	GRH3 25A	GRH3 30A	GRH3 35A	GRH3 50A	GRH3 75A	GRH3 100A
COMPRESSOR	TYPE		Single Stage Oil Injection Screw Air Compressor						
	CAPACITY FAD* (m³/min)	7.0 bar	2.4	3.0	3.6	4.3	6.7	10.3	13.6
		8.5 bar	2.2	2.7	3.3	4.0	5.8	9.1	12.0
		9.9 bar	2.0	2.4	3.0	3.7	5.3	8.3	10.7
	OIL CAPACITY(ℓ)		15				25	50	
	DRIVING METHOD		Belt driven					Gear driven	
	STARTING		Direct	Star-Delta Starter					
CONNECT PIPE SIZE		25A				40A	50A		
MOTOR	MOTOR POWER(kW)		15	18	22	27	37	55	75
	POLES(P)		4						
	VOLTAGE(V)		AC220, 380, 440 3 Phase						
	FREQUENCY(Hz)		50/60						
	PROTECTION DEGREE		IP22						
	FAN MOTOR(kW)		1.1				1.6	1.6x2	
GRNERAL	SERVICE AIR TEMP.(°C)		Ambient Temperature + 15℃						
	ALLOWABLE AMBIENT TEMP.(°C)		MAX. 40℃						
	NOISE LEVEL		66	67	68	69	70	72	73
DIMENSION	Width(mm)		1000				1100	2000	
	Depth(mm)		1400				1600	1350	
	Height(mm)		1350				1500	1700	
	Weight(kg)		673	700	726	753	940	1596	1713

NOTE> DIMENSION and other data may change for the performance improvement.

## 10. Maintenance Checklist

● Check or cleaning    ○ Replacement

Parts to check		Check point	Check period							Notes
			Daily	1 mth	2 mths	6 mths	1 yr	2 yrs	4 yrs	
				500h	1000h	3000h	6000h	12000h	24000h	
Electric control	Temp. · Pressure	Check	●							Check indication
	Electric box	Check		●						Cleaning if there is built-in dust
	Protective/safety devices	Check			●					Check indication
	Power cable deterioration	Check	●							Visually check coupling status
	Magnet	Check		●						Check cable's tightness
Oil & Filters	Oil leakage	Check/replace	●							
	Oil surface	Check	●							Replenish if insufficient
	Air filter	Replace				○				3000Hr
	Oil Filters	Replace		○		○				Replacement in the first 500h
	Oil separator	Replace				○				If differential pressure is 1.0bar and higher
	Oil	Replace		○	●	○				Replacement in the first 500h
Machine	Belt and coupling			●			●		○	Check tension/separation
	Safety valve operation	Check					●			
	Abnormal noise/vibration		●							
Main Motor	Insulation						●			
	Bearing			●					○	Refer to motor's spec.
	Grease						●		○	Refer to motor's spec.
Air end	Bearing								○	4 years
	Oil seal						●		○	4 years
	O-ring								○	4 years
	Rotor								●	
Cooler	Oil cooler					●				
	After cooler			Check		●				

## 11. Operation Log

# Operation Log

[illegible]



## 12. Quality Warranty

### 1. Warranty

Warranty period of major parts

Period \ Parts	Warranty period(first occurrence)		Notes
	Based on the date of use	Based on the date of delivery	
Air end	24 months	30 months	
Instrumentation and control parts	6 months	12 months	
Other parts	12 months	18 months	

Warranty coverage: any trouble that occurs under the normal use in accordance with the user's manual and the notices attached on the product shall be warranted by replacement of the product or its parts free of charge. However, the following cases shall be covered by pay service.

- ① In case the warranty period is expired
- ② User's mishandling
- ③ Any trouble or damages resulting from repairs or alteration executed by others save for the authorized dealers(agents)
- ④ Any trouble or damages owing to use of non-genuine parts
- ⑤ Damages from abnormal power attributable to fire, earthquake, flood, lightning and other natural disasters
- ⑥ Trouble or damage attributable to wrongly selected installation place

i.e.) Operation beyond the allowable ambient temperature between 0 ~ 40 °C  
 Prohibited conditions: any place with flammable, combustible or explosive gas or any place with metals, cement or crushed rock

- The warranty is valid only in the Republic of Korea.
- Any secondary damages such as production schedule delay resulting from the trouble of the product may not be covered by the warranty.
- The warranty is limited to the foresaid issues.
- If any trouble occurs during use, please contact your dealer or our A/S service center.

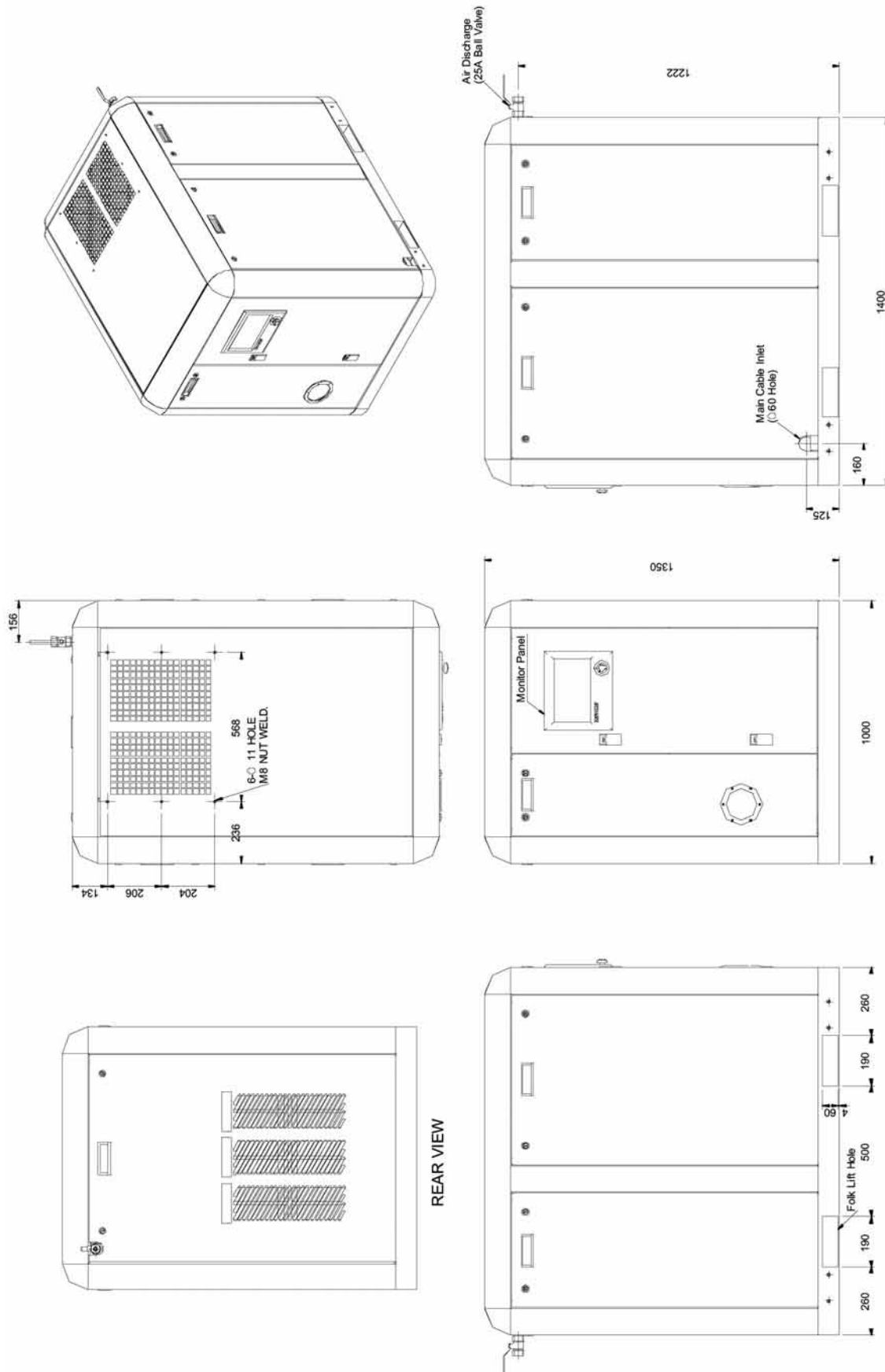
### 2. A/S Service

Before asking the repair, make sure to read and recheck [Troubleshooting] first.  
 If the production is not recovered even after the troubleshooting, check the followings and contact your dealer or our A/S service center.

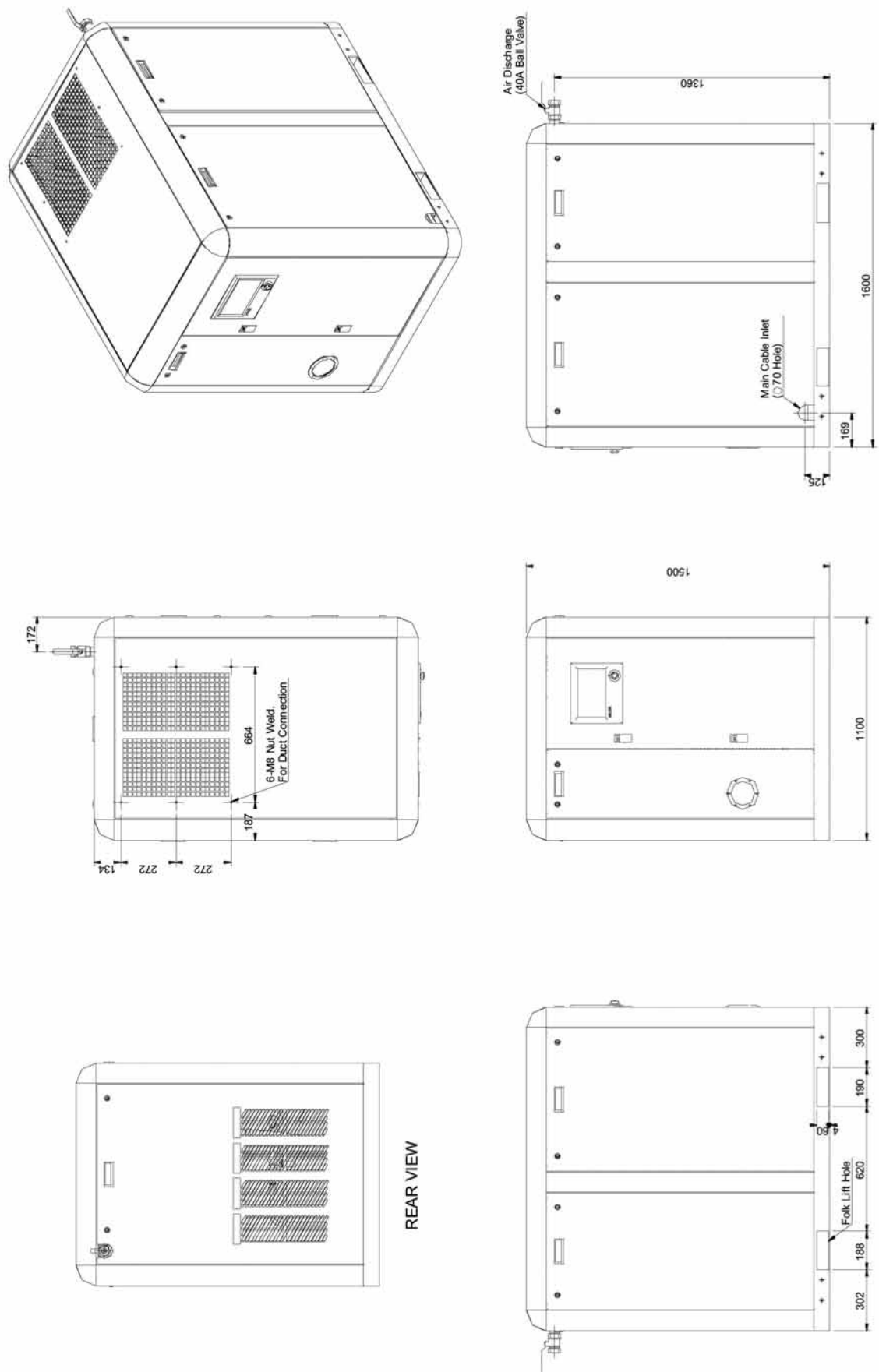
- Type
- Manufacturing number
- Operation time and
- Trouble description
- Operation status of the facility

## 13. Outside Drawing by Models

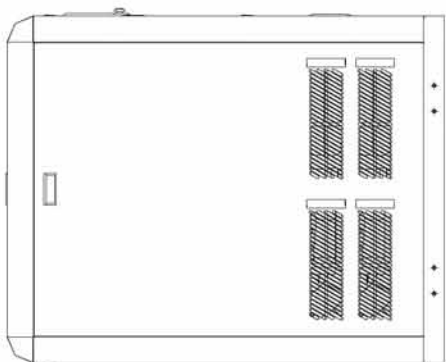
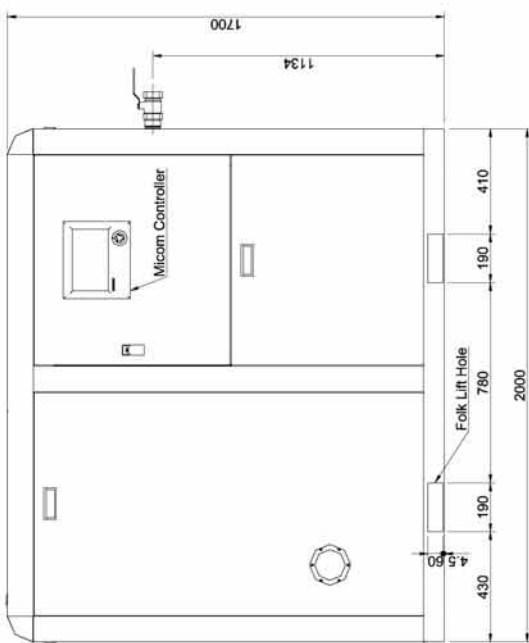
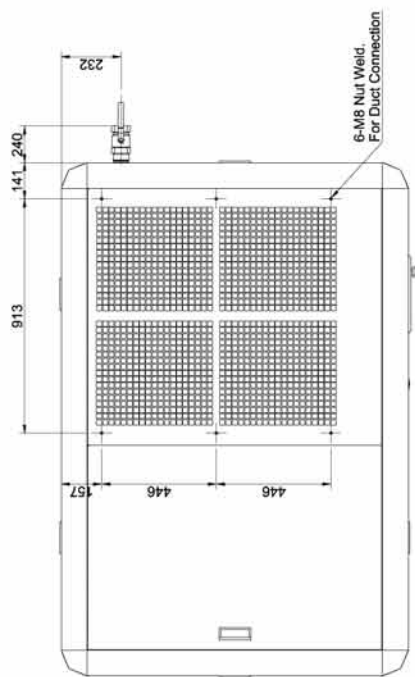
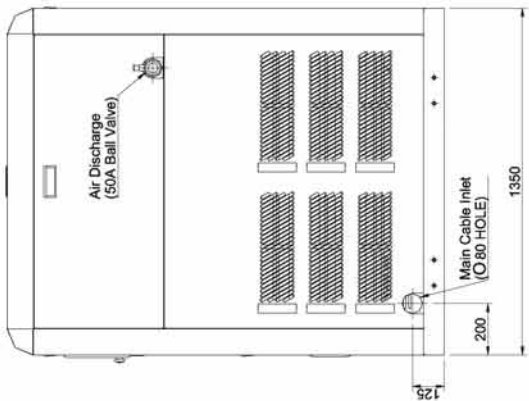
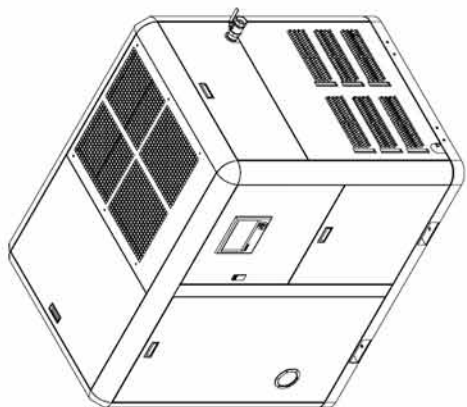
### 1. GRH3-20A, 25A, 30A, 35A



2. GRH3-50A

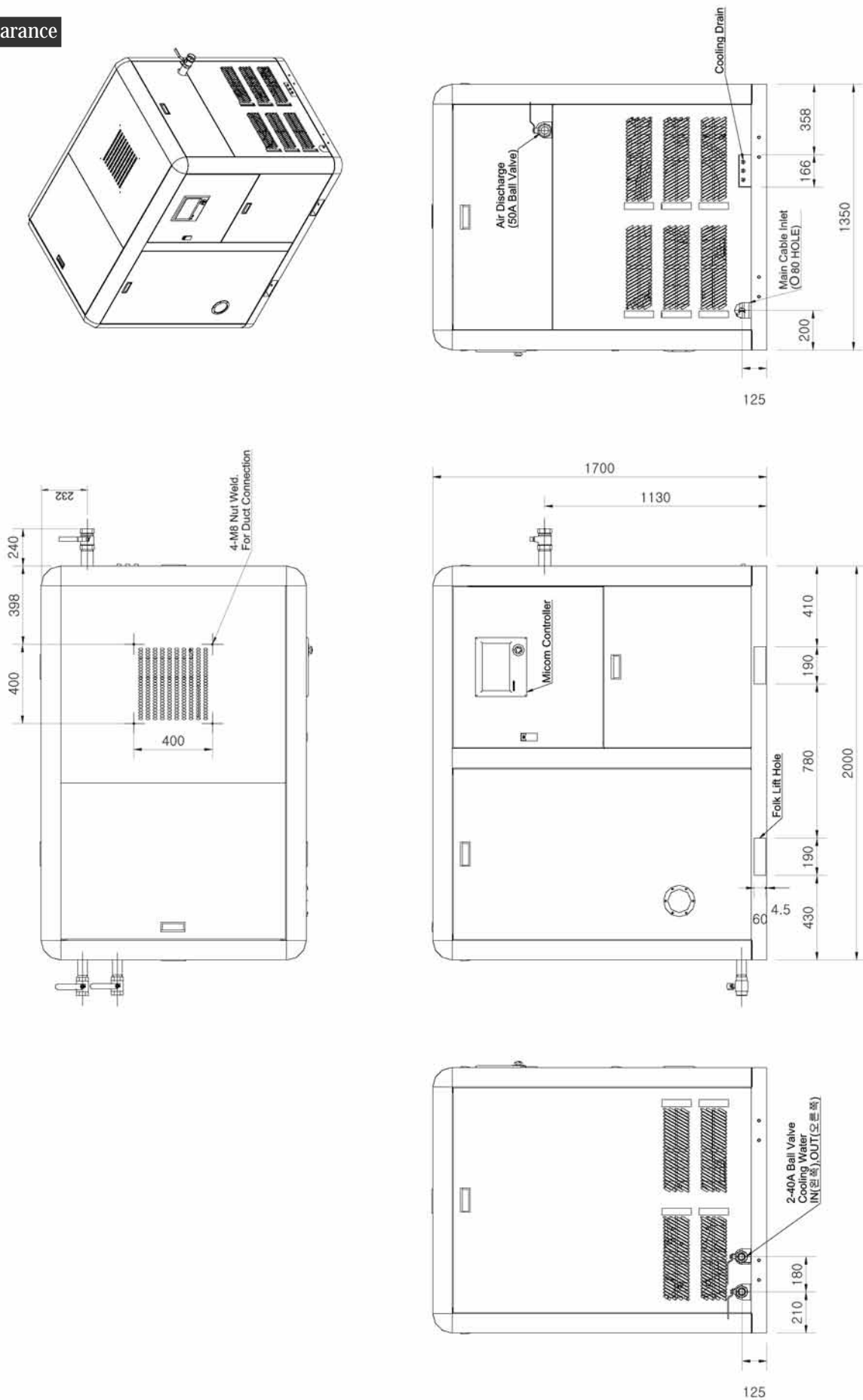


3. GRH3-75A, 100A

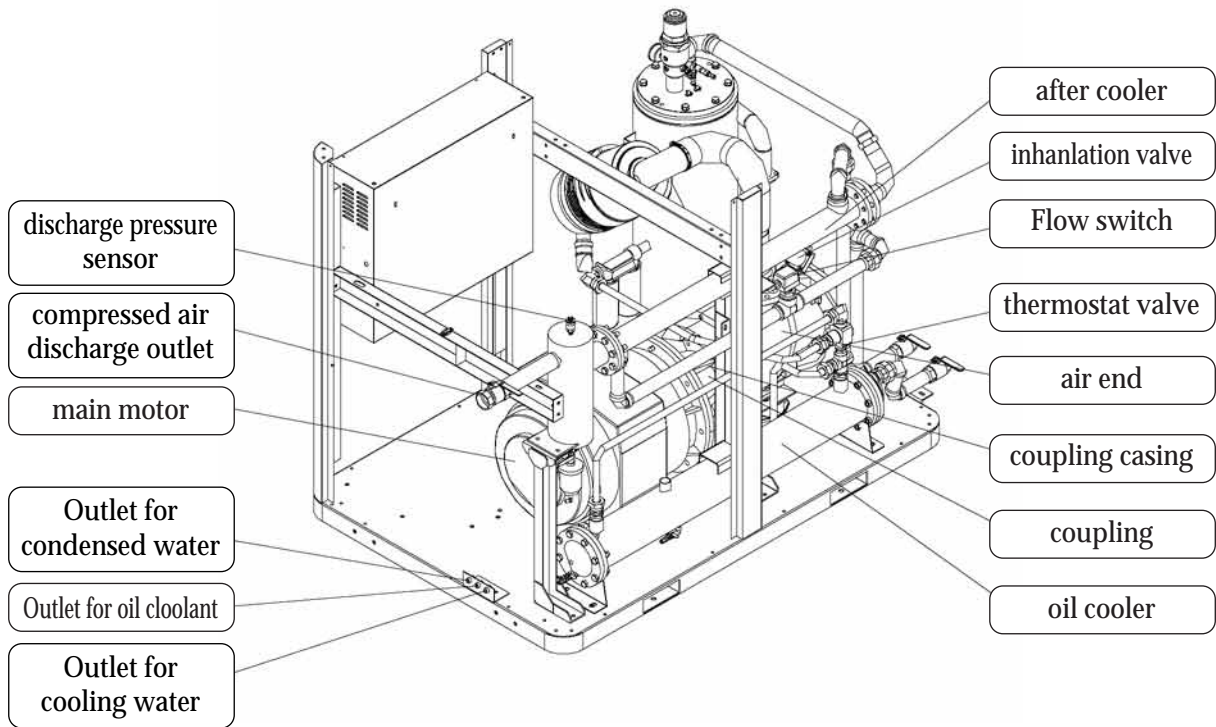
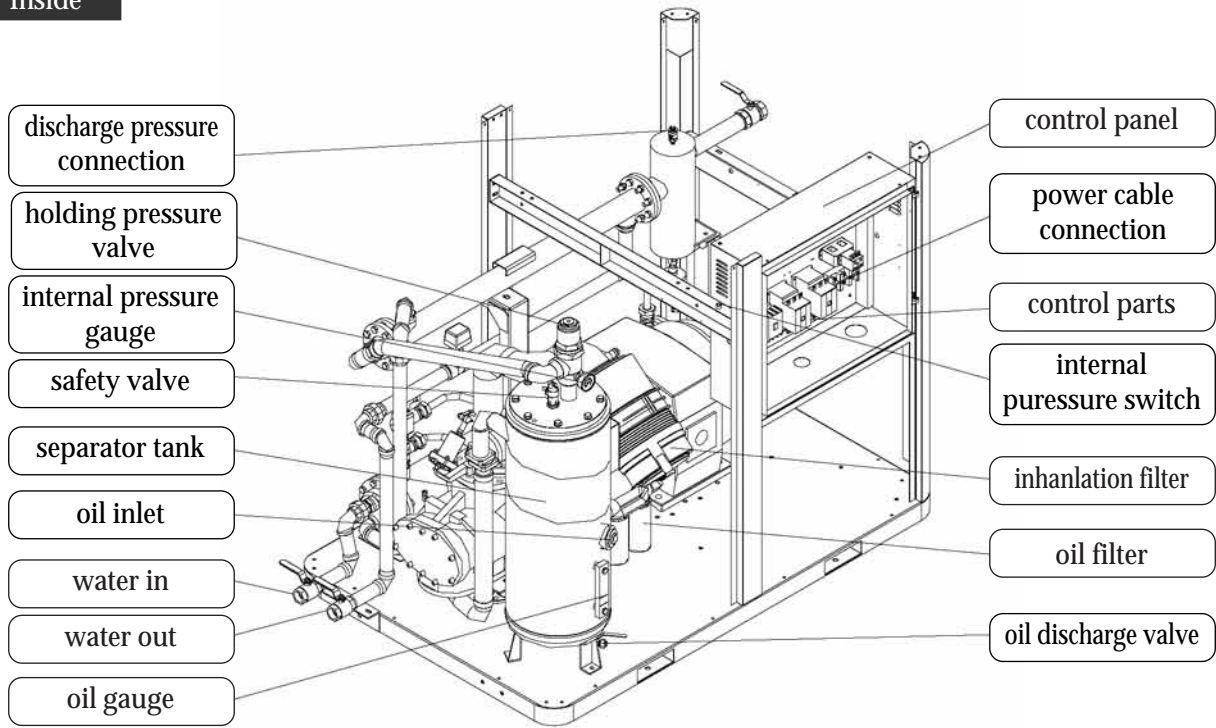


4. GRH3-75W, 100W

Appearance



Inside



MEMO